HP ProLiant DL388p Gen8 Server User Guide

Abstract

This document is for the person who installs, administers, and troubleshoots servers and storage systems. HP assumes you are qualified in the servicing of computer equipment and trained in recognizing hazards in products with hazardous energy levels.

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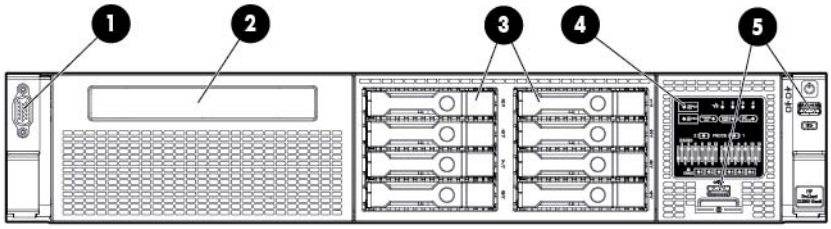
Component identification

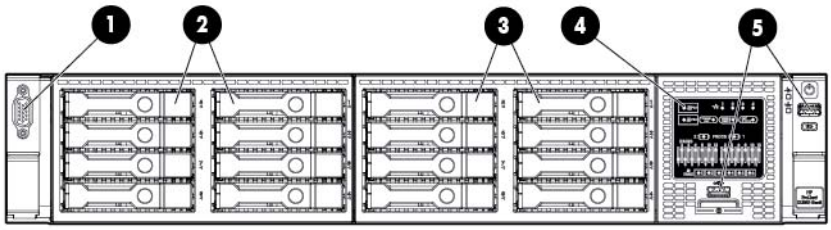
Front panel components

- SFF model



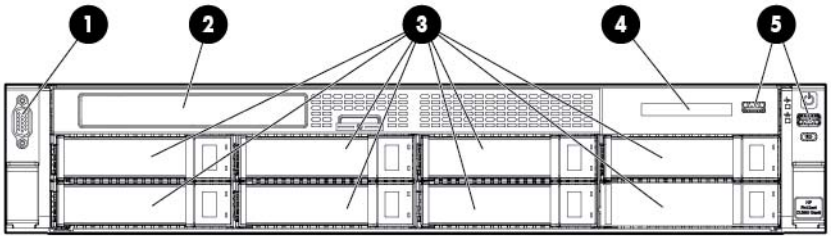
Item	Description
1	Video connector
2	SATA optical drive bay
3	Drive bays
4	Systems Insight Display
5	USB connectors (2)

- SFF model with optional hard drive cage



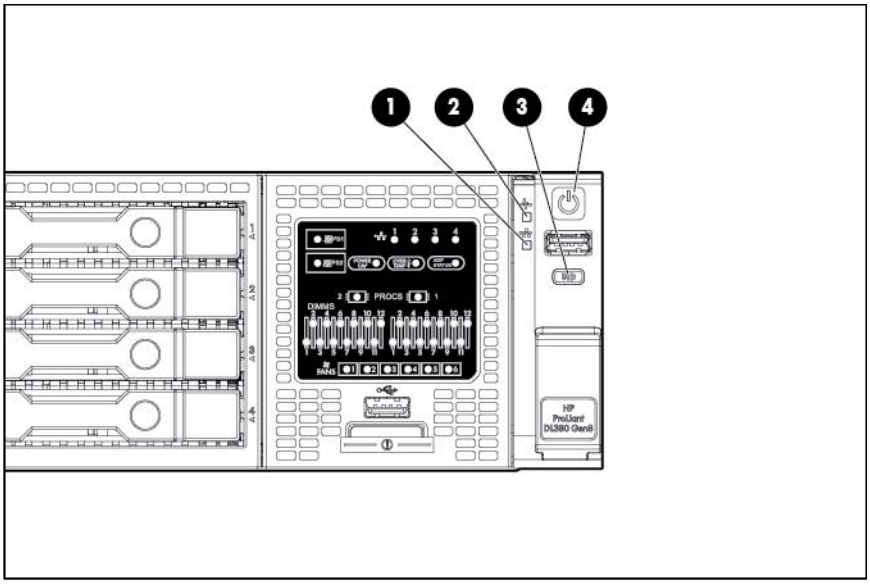
Item	Description
1	Video connector
2	Drive bays (box 1)
3	Drive bays (box 2)
4	Systems Insight Display
5	USB connectors (2)

- LFF model



Item	Description
1	Video connector
2	SATA optical drive bay
3	Drive bays
4	Systems Insight Display
5	USB connectors (2)

Front panel LEDs and buttons



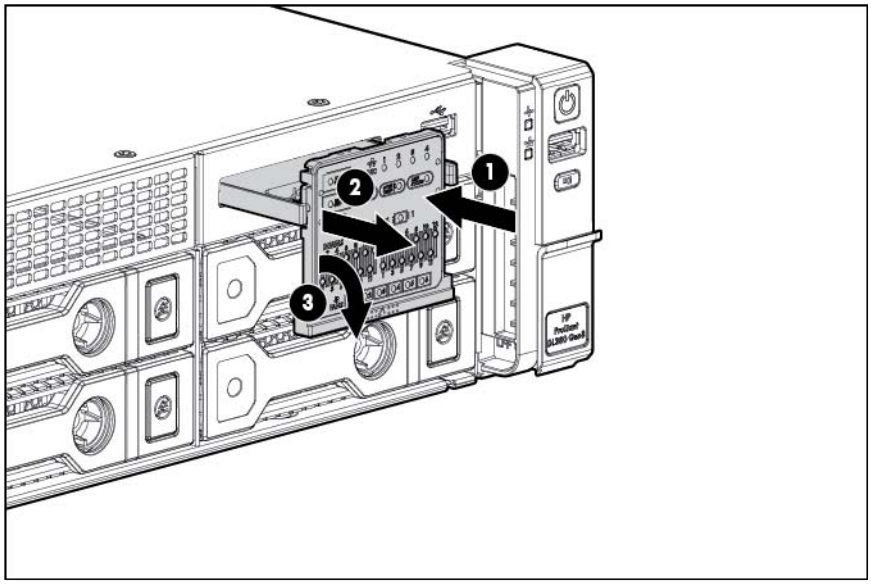
Item	Description	Status
1	Aggregate network LED	Off = No network link Solid green = Link to network Flashing green = Network activity
2	System health LED	Solid Green = Normal Flashing Amber = System degraded Flashing Red = System critical To identify components in degraded or critical state, see "Systems Insight Display LEDs (on page 10)."

Item	Description	Status
3	UID LED and button	Off = Deactivated Solid Blue = Activated Flashing Blue = System being remotely managed
4	Power On/Standby button and system power LED	Off = Power cord not attached or power supply failure Solid Amber = System is in standby; Power On/Standby Button service is initialized. Flashing Green = Power On/Standby Button has been pressed; system is waiting to power on. Solid Green = System on

Access the Systems Insight Display

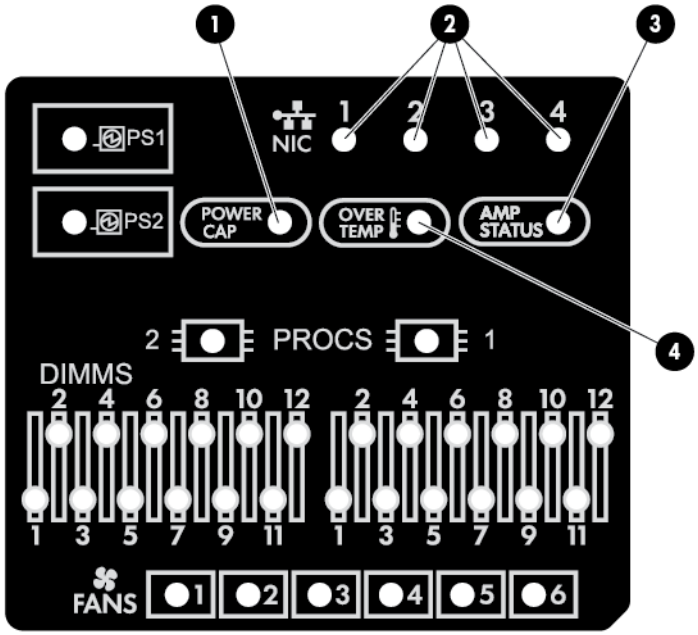
To access the HP Systems Insight Display in a server with a LFF configuration:

1. Press and release the panel.
2. After the display fully ejects, rotate the display downward to view the LEDs.



Systems Insight Display LEDs

The HP Systems Insight Display LEDs represent the system board layout. The display enables diagnosis with the access panel installed.



Item	Description	Status
1	Power cap	Off = System is in standby, or no cap is set. Solid green = Power cap applied
2	NIC link/activity	Off = No link to network. If the power is off, view the rear panel RJ-45 LEDs for status ("Rear panel LEDs and buttons" on page 12). Flashing green = Network link and activity Solid green = Network link
3	AMP status	Off = AMP modes disabled Solid green = AMP mode enabled Solid amber = Failover Flashing amber = Invalid configuration
4	Over temp	Off = Normal Solid amber = High system temperature detected
—	All other LEDs	Off = Normal Amber = Failure For more information on the activation of these LEDs, see "Systems Insight Display LED combinations (on page 11)."

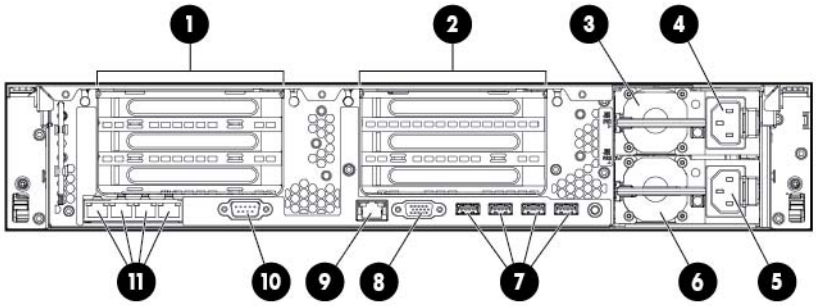
Systems Insight Display LED combinations

When the health LED on the front panel illuminates either amber or red, the server is experiencing a health event. Combinations of illuminated Systems Insight Display LEDs, the system power LED, and the health LED indicate system status.

Systems Insight Display LED and color	Health LED	System power LED	Status
Processor (amber)	Red	Amber	One or more of the following conditions may exist: • Processor in socket *X* has failed. • Processor *X* is not installed in the socket. • Processor *X* is unsupported. • ROM detects a failed processor during POST.
Processor (amber)	Amber	Green	Processor in socket *X* is in a pre-failure condition.
DIMM (amber)	Red	Green	One or more DIMMs have failed.
DIMM (amber)	Amber	Green	DIMM in slot *X* is in a pre-failure condition.
Over temp (amber)	Amber	Green	The Health Driver has detected a cautionary temperature level.
Over temp (amber)	Red	Amber	The server has detected a hardware critical temperature level.
PCI riser (amber)	Red	Green	The PCI riser cage is not seated properly.
Fan (amber)	Amber	Green	One fan has failed or has been removed.
Fan (amber)	Red	Green	Two or more fans have failed or been removed.
Power supply (amber)	Red	Amber	One or more of the following conditions may exist: • Only one power supply is installed and that power supply is in standby. • Power supply fault • System board fault
Power supply (amber)	Amber	Green	One or more of the following conditions may exist: • Redundant power supply is installed and only one power supply is functional. • AC power cord is not plugged into redundant power supply. • Redundant power supply fault • Power supply mismatch at POST or power supply mismatch through hot-plug addition
Power cap (off)	—	Amber	Standby
Power cap (green)	—	Flashing green	Waiting for power
Power cap (green)	—	Green	Power is available.

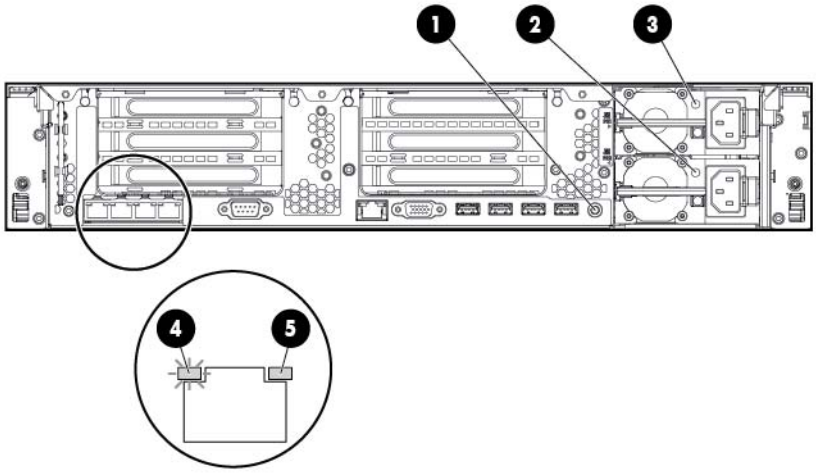
IMPORTANT: If more than one DIMM slot LED is illuminated, further troubleshooting is required. Test each bank of DIMMs by removing all other DIMMs. Isolate the failed DIMM by replacing each DIMM in a bank with a known working DIMM.

Rear panel components



Item	Description
1	PCIe slots 1–3 (top to bottom)
2	PCIe slots 4–6 (top to bottom)
3	Power supply 1 (PS1)
4	PS1 power connector
5	PS2 power connector
6	Power supply 2 (PS2)
7	USB connectors (4)
8	Video connector
9	iLO connector
10	Serial connector
11	FlexLOM ports (Shown: 4x1Gb/Optional: 2x10Gb); port 1 on right side

Rear panel LEDs and buttons



Item	Description	Status
1	UID LED/button	Off = Deactivated Solid blue = Activated Flashing blue = System being managed remotely
2	Power supply 2 LED	Off = System is off or power supply has failed. Solid green = Normal
3	Power supply 1 LED	Off = System is off or power supply has failed. Solid green = Normal
4	NIC activity LED	Off = No network activity Solid green = Link to network Flashing green = Network activity
5	NIC link LED	Off = No network link Green = Network link

Non-hot-plug PCI riser board slot definitions

- Primary riser cage connector, connected to processor 1 or the southbridge

	PCIe 3-slot riser cage*	PCIe 2-slot x16 riser cage
1 - FL/FH	PCIe2 or PCIe3** x16 (16,8,4,2,1)	—
2 - HL/FH	PCIe2 or PCIe3** x8 (8,4,2,1)	—
3 - HL/FH	PCIe2 x8 (4,2,1)†	—

- Secondary riser cage connector, connected to processor 2 (Processor 2 must be installed)

	PCIe 3-slot riser cage*	PCIe 2-slot x16 riser cage
4 - FL/FH	PCIe2 or PCIe3** x16 (16,8,4,2,1)	PCIe2 or PCIe3** x16 (16,8,4,2,1)
5 - HL/FH	PCIe2 or PCIe3** x8 (8,4,2,1)	PCIe2 or PCIe3** x16 (16,8,4,2,1)
6 - HL/FH	PCIe2 or PCIe3** x8 (8,4,2,1)	—

*The server ships with one PCIe3 riser cage installed in the primary riser cage connector.

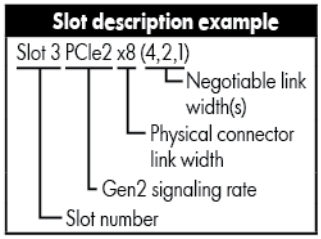
**These slots can run 8 GT/s signaling rate in either PCIe2 or PCIe3 mode, depending on the capability of the installed processor.

†PCIe slot 3 is connected to the southbridge and runs at the Gen2 signaling rate.

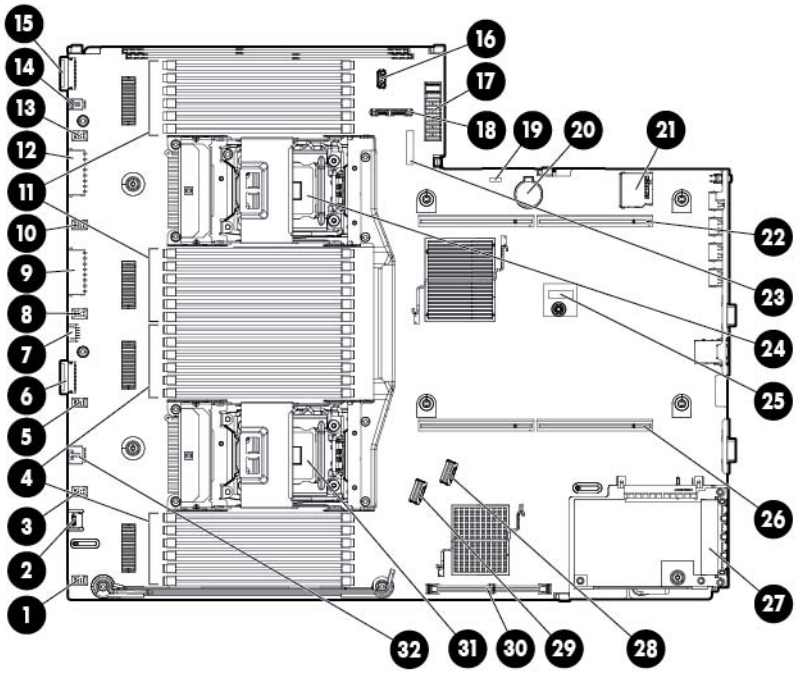
Notes:

- "Primary" denotes the riser cage is installed in the primary riser connector.
- "Secondary" denotes the riser cage is installed in the secondary riser connector.
- Installing the riser cages listed in the table above in either the primary or secondary riser connectors determines the form factor of the PCI cards supported by those riser cages.
- FL/FH denotes full-length, full-height. HL/FH denotes half-length, full-height. LP denotes low profile.

- The PCIe2 x16 riser cage supports a maximum power of 150 W with an HP power cable. This cable must be used for PCIe card wattages greater than 75 W.



System board components



Item	Description
1	Fan connector 6
2	Systems Insight Display connector
3	Fan connector 5
4	Processor 1 DIMM slots
5	Fan connector 4
6	Front I/O connector
7	Front USB connector
8	Fan connector 3
9	First drive cage, box 2 power connector
10	Fan connector 2
11	Processor 2 DIMM slots

Item	Description
12	Second drive cage, box 1 power connector
13	Fan connector 1
14	Discovery services connector
15	Front video connector
16	USB connector
17	Power supply backplane connector
18	SATA optical drive connector
19	NMI jumper
20	System battery
21	SD card slot
22	Secondary (processor 2) PCI riser connector
23	System maintenance switch
24	Processor 2 socket
25	TPM connector
26	Primary (processor 1) PCI riser connector
27	FlexLOM
28	SAS connector 1
29	SAS connector 2
30	Cache module connector
31	Processor 1 socket
32	RDX power connector

System maintenance switch

Position	Default	Function
S1	Off	Off = HP iLO security is enabled. On = HP iLO security is disabled.
S2	Off	Off = System configuration can be changed. On = System configuration is locked.
S3	Off	Reserved
S4	Off	Reserved
S5	Off	Off = Power-on password is enabled. On = Power-on password is disabled.
S6	Off	Off = No function On = ROM reads system configuration as invalid.
S7	—	Reserved
S8	—	Reserved
S9	—	Reserved
S10	—	Reserved
S11	—	Reserved
S12	—	Reserved

To access redundant ROM, set S1, S5, and S6 to on.

When the system maintenance switch position 6 is set to the On position, the system is prepared to erase all system configuration settings from both CMOS and NVRAM.

△ **CAUTION:** Clearing CMOS and/or NVRAM deletes configuration information. Be sure to properly configure the server or data loss could occur.

NMI functionality

An NMI crash dump enables administrators to create crash dump files when a system is hung and not responding to traditional debug mechanisms.

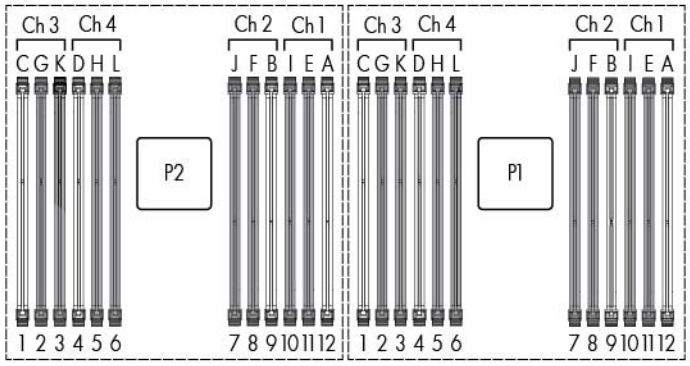
Crash dump log analysis is an essential part of diagnosing reliability problems, such as hangs in operating systems, device drivers, and applications. Many crashes freeze a system, and the only available action for administrators is to cycle the system power. Resetting the system erases any information that could support problem analysis, but the NMI feature preserves that information by performing a memory dump before a hard reset.

To force the OS to invoke the NMI handler and generate a crash dump log, the administrator can use the iLO Virtual NMI feature.

For more information, see the white paper on the HP website (http://h20000.www2.hp.com/bc/docs/support/SupportManual/c00797875/c00797875.pdf).

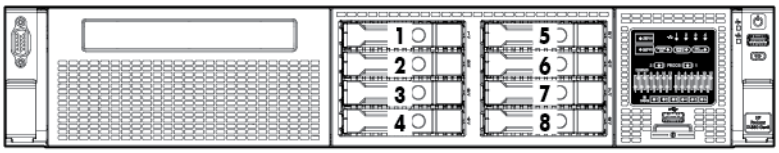
DIMM slot locations

DIMM slots are numbered sequentially (1 through 12) for each processor. The supported AMP modes use the letter assignments for population guidelines.

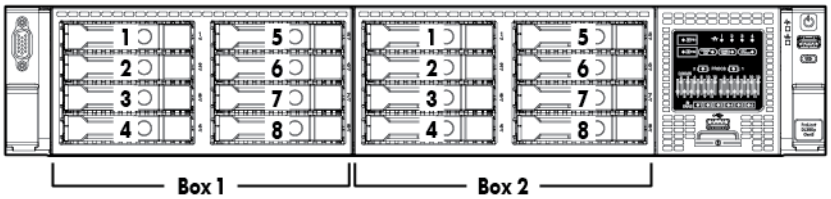


SAS and SATA device numbers

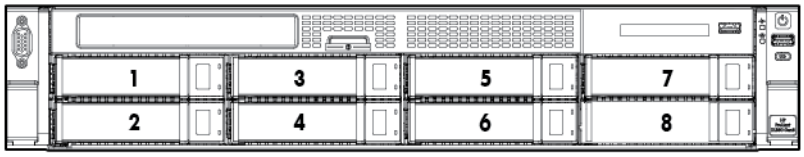
- SFF device bay numbering



- Optional SFF device bay numbering

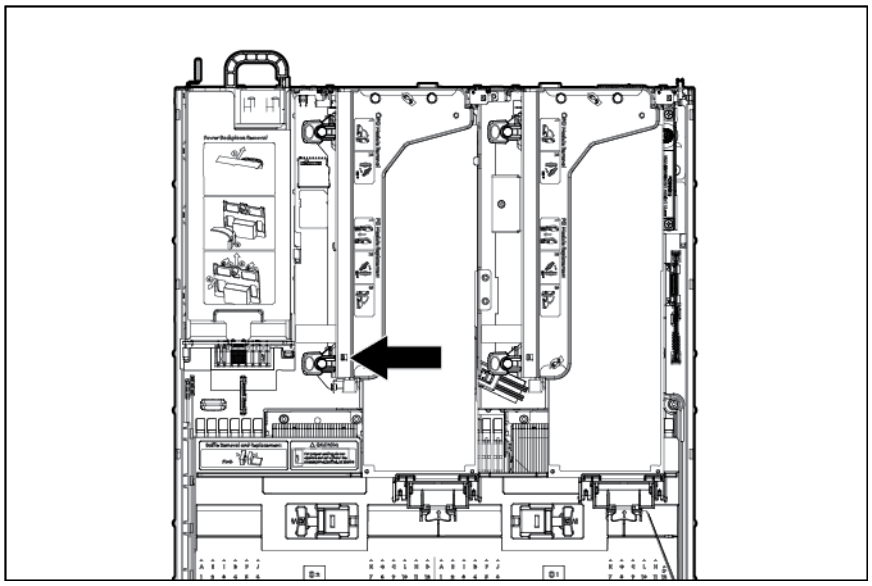


- LFF device bay numbering



PCI riser cage LED

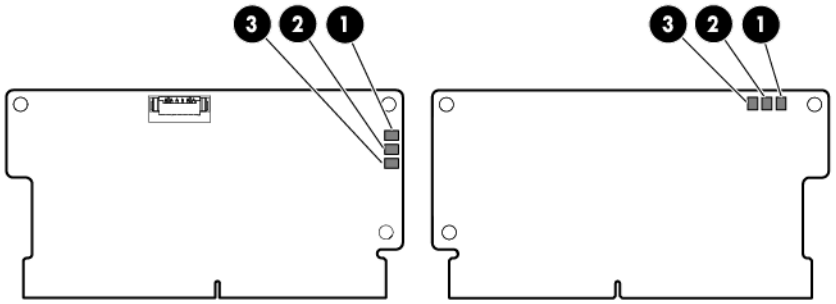
△ **CAUTION:** To prevent damage to the server or expansion boards, power down the server and remove all AC power cords before removing or installing the PCI riser cage.



Status
On = AC power is connected.
Off = AC power is disconnected.
Missing = Riser cage is not installed, or power might not be connected.

FBWC module LEDs (P222, P420, P421)

The FBWC module has three single-color LEDs (one amber and two green). The LEDs are duplicated on the reverse side of the cache module to facilitate status viewing.



1 - Amber	2 - Green	3 - Green	Interpretation
Off	Off	Off	The cache module is not powered.
Off	Flashing 0.5 Hz	Flashing 0.5 Hz	The cache microcontroller is executing from within its boot loader and receiving new flash code from the host controller.
Off	Flashing 1 Hz	Flashing 1 Hz	The cache module is powering up, and the capacitor pack is charging.

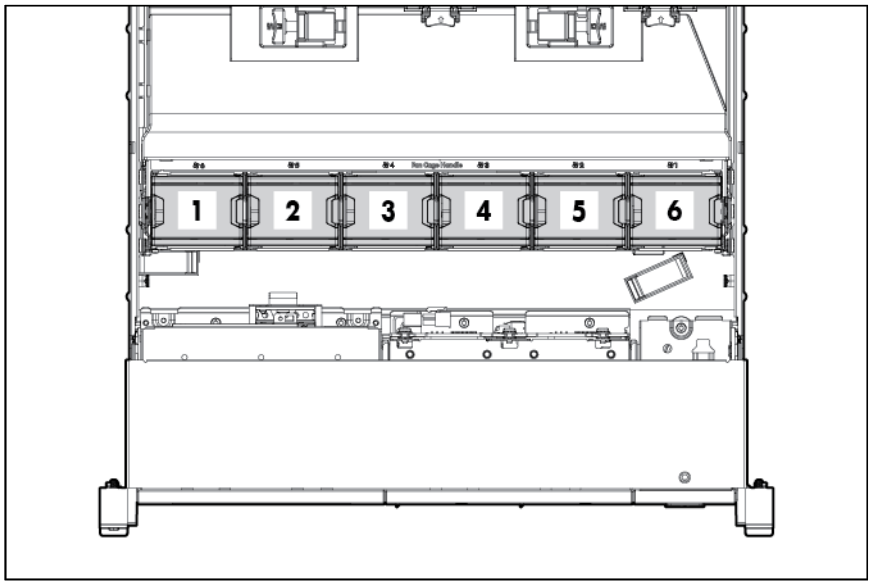
1 - Amber	2 - Green	3 - Green	Interpretation
Off	Off	Flashing 1 Hz	The cache module is idle, and the capacitor pack is charging.
Off	Off	On	The cache module is idle, and the capacitor pack is charged.
Off	On	On	The cache module is idle, the capacitor pack is charged, and the cache contains data that has not yet been written to the drives.
Off	Flashing 1 Hz	Off	A backup is in progress.
Off	On	Off	The current backup is complete with no errors.
Flashing 1 Hz	Flashing 1 Hz	Off	The current backup failed, and data has been lost.
Flashing 1 Hz	Flashing 1 Hz	On	A power error occurred during the previous or current boot. Data may be corrupt.
Flashing 1 Hz	On	Off	An overtemperature condition exists.
Flashing 2 Hz	Flashing 2 Hz	Off	The capacitor pack is not attached.
Flashing 2 Hz	Flashing 2 Hz	On	The capacitor has been charging for 10 minutes, but has not reached sufficient charge to perform a full backup.
On	On	Off	The current backup is complete, but power fluctuations occurred during the backup.
On	On	On	The cache module microcontroller has failed.

Hot-plug fans

△ **CAUTION:** To avoid damage to server components, fan blanks must be installed in fan bays 1 and 2 in a single-processor configuration.

The only two valid fan configurations are listed in the following table.

Configuration	Fan bay 1	Fan bay 2	Fan bay 3	Fan bay 4	Fan bay 5	Fan bay 6
1 processor	Fan blank	Fan blank	Fan	Fan	Fan	Fan
2 processors	Fan	Fan	Fan	Fan	Fan	Fan



For a single-processor configuration, four fans and two blanks are required in specific fan bays for redundancy. A fan failure or missing fan causes a loss of redundancy. A second fan failure or missing fan causes an orderly shutdown of the server.

Installing more than the required number of fans in a single-processor configuration is not a supported configuration.

For a dual-processor configuration, six fans are required for redundancy. A fan failure or missing fan causes a loss of redundancy. A second fan failure or missing fan causes an orderly shutdown of the server.

The server supports variable fan speeds. The fans operate at minimum speed until a temperature change requires a fan speed increase to cool the server. The server shuts down during the following temperature-related scenarios:

- At POST and in the OS, HP iLO performs an orderly shutdown if a cautionary temperature level is detected. If the server hardware detects a critical temperature level before an orderly shutdown occurs, the server performs an immediate shutdown.
- When the Thermal Shutdown feature is disabled in RBSU, HP iLO does not perform an orderly shutdown when a cautionary temperature level is detected. Disabling this feature does not disable the server hardware from performing an immediate shutdown when a critical temperature level is detected.

△ **CAUTION:** A thermal event can damage server components when the Thermal Shutdown feature is disabled in RBSU.

Operations

Power up the server

To power up the server, press the Power On/Standby button.

Power down the server

Before powering down the server for any upgrade or maintenance procedures, perform a backup of critical server data and programs.

IMPORTANT: When the server is in standby mode, auxiliary power is still being provided to the system.

To power down the server, use one of the following methods:

- Press and release the Power On/Standby button.

  This method initiates a controlled shutdown of applications and the OS before the server enters standby mode.
- Press and hold the Power On/Standby button for more than 4 seconds to force the server to enter standby mode.

  This method forces the server to enter standby mode without properly exiting applications and the OS. If an application stops responding, you can use this method to force a shutdown.
- Use a virtual power button selection through HP iLO.

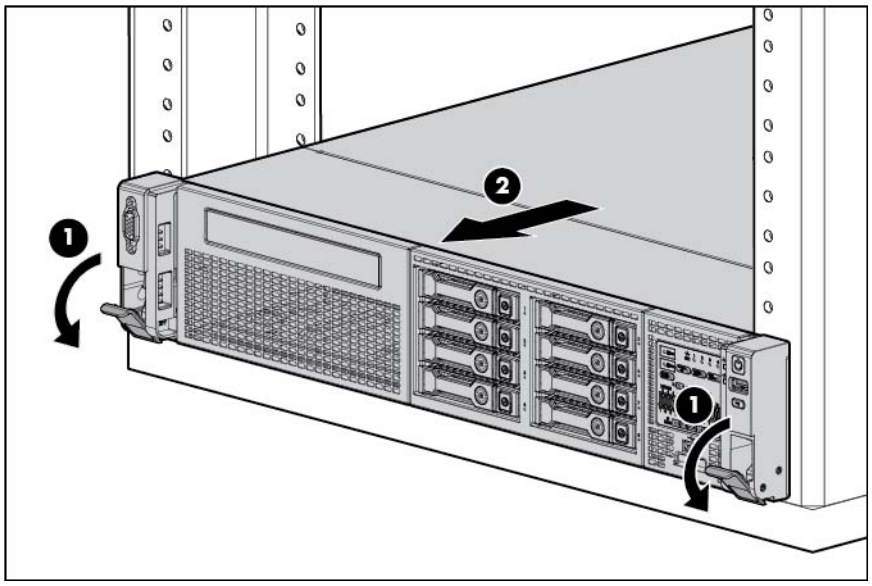
  This method initiates a controlled remote shutdown of applications and the OS before the server enters standby mode.

Before proceeding, verify the server is in standby mode by observing that the system power LED is amber.

Extend the server from the rack

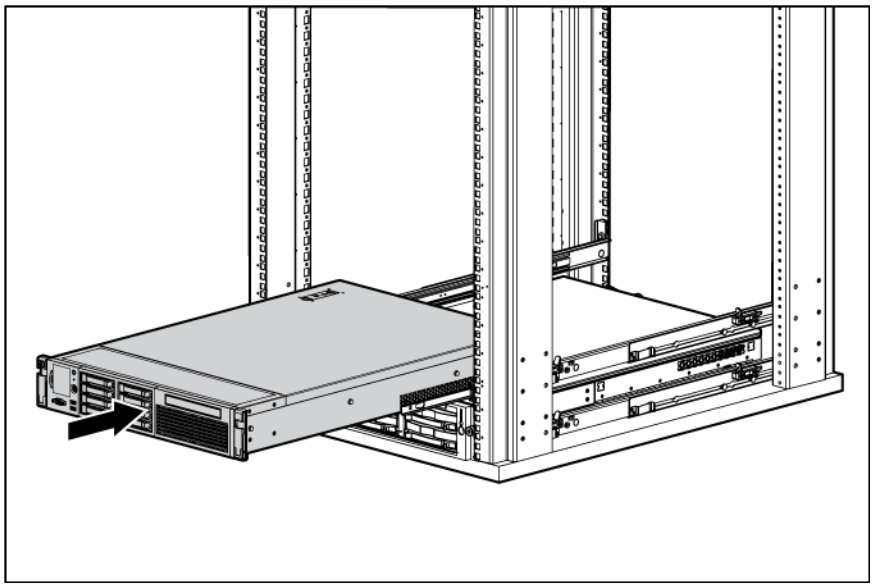
1. Pull down the quick release levers on each side of the server.
2. Extend the server from the rack.

WARNING: To reduce the risk of personal injury or equipment damage, be sure that the rack is adequately stabilized before extending a component from the rack.



3. After performing the installation or maintenance procedure, slide the server back into the rack, and then press the server firmly into the rack to secure it in place.

WARNING: To reduce the risk of personal injury, be careful when pressing the server rail-release latches and sliding the server into the rack. The sliding rails could pinch your fingers.



Remove the access panel

WARNING: To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

CAUTION: For proper cooling do not operate the server without the access panel, baffles, expansion slot covers, or blanks installed. If the server supports hot-plug components, minimize the amount of time the access panel is open.

To remove the component:

1. Power down the server if performing a non-hot-plug installation or maintenance procedure ("Power down the server" on page 21).
2. Extend the server from the rack (on page 21).
3. Use the T-15 Torx screwdriver attached to the rear of the server to loosen the security screw on the hood latch.
4. Lift up on the hood latch handle, and then remove the access panel.

Install the access panel

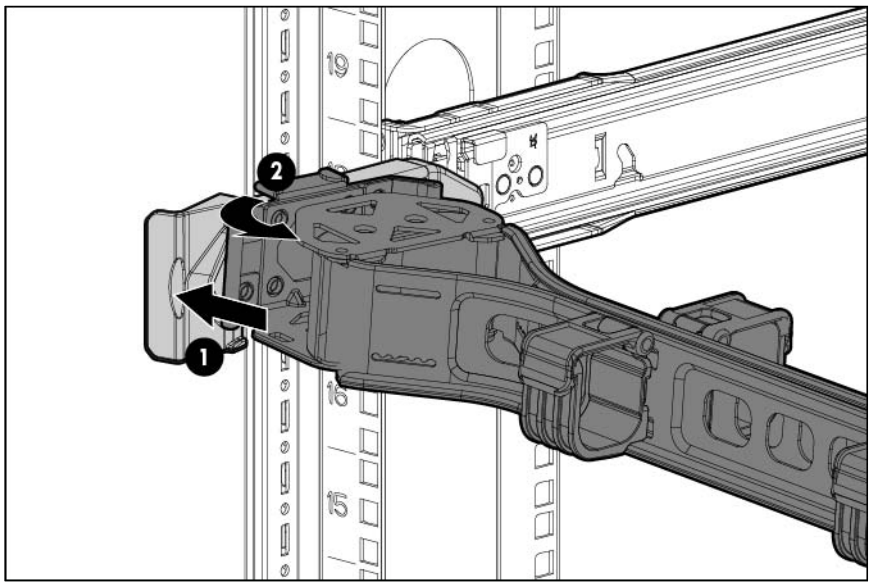
1. Place the access panel on top of the server with the hood latch open. Allow the panel to extend past the rear of the server approximately 1.25 cm (0.5 in).
2. Push down on the hood latch. The access panel slides to a closed position.
3. Use the T-15 Torx screwdriver attached to the rear of the server to tighten the security screw on the hood latch.

Access the product rear panel

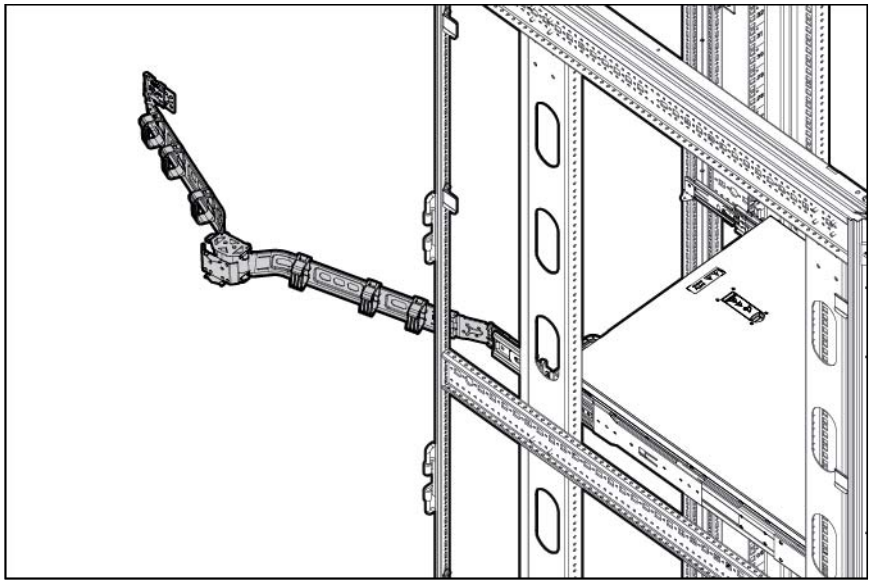
Opening the cable management arm

To access the server rear panel:

1. Release the cable management arm.



2. Open the cable management arm. Note that the cable management arm can be right-mounted or left-mounted.

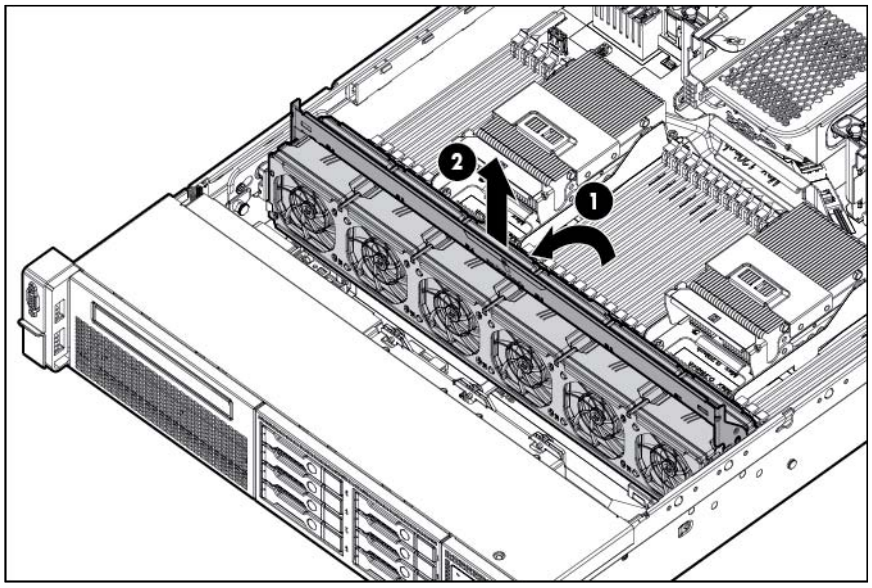


Remove the hot-plug fan cage

To remove the component:

1. Power down the server (on page 21).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Extend or remove the server from the rack ("Extend the server from the rack" on page 21).
4. Remove the access panel (on page 22).
5. Remove the air baffle (on page 29).

6. Remove the fan cage.



CAUTION: Do not operate the server for long periods with the access panel open or removed. Operating the server in this manner results in improper airflow and improper cooling that can lead to thermal damage.

IMPORTANT: For optimum cooling, install fans in all primary fan locations. For more information, refer to the fan locations table ("Hot-plug fans" on page 19).

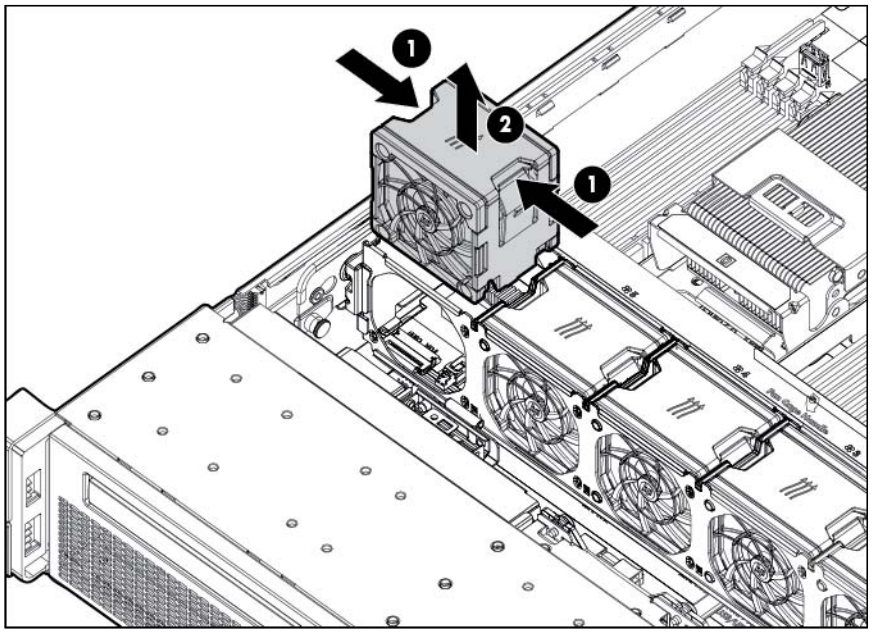
To replace the component, reverse the removal procedure.

Remove the hot-plug fan

To remove the component:

1. Extend or remove the server from the rack ("Extend the server from the rack" on page 21).
2. Remove the access panel (on page 22).

3. Remove the fan.



CAUTION: Do not operate the server for long periods with the access panel open or removed. Operating the server in this manner results in improper airflow and improper cooling that can lead to thermal damage.

IMPORTANT: For optimum cooling, install fans in all primary fan locations. For more information, refer to the fan locations table ("Hot-plug fans" on page 19).

To replace the component, reverse the removal procedure.

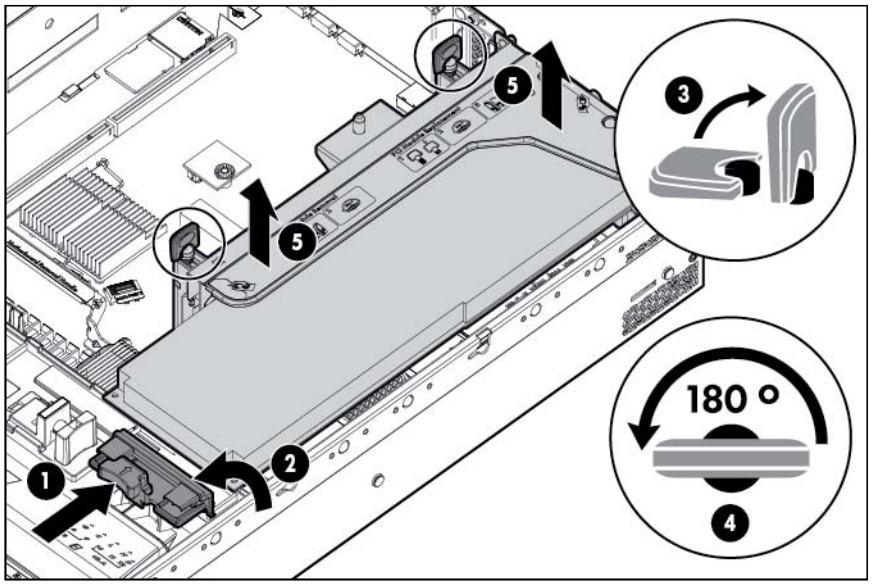
Remove the full-length expansion board

CAUTION: To prevent damage to the server or expansion boards, power down the server and remove all AC power cords before removing or installing the PCI riser cage.

To remove the component:

1. Power down the server (on page 21).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Extend the server from the rack (on page 21).
4. Remove the access panel (on page 22).

5. Release the full-length expansion board retainer, and then remove the PCI riser cage.



6. Remove the full-length expansion board.

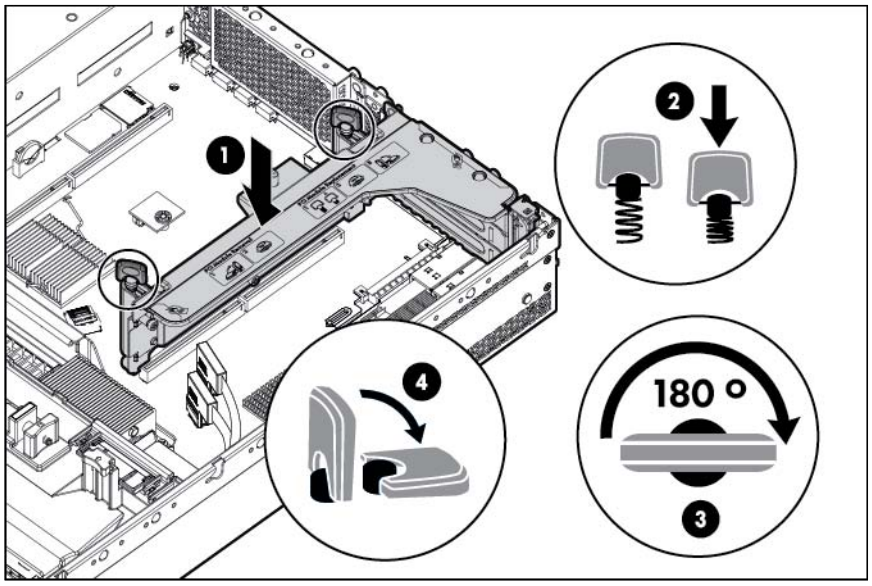
To replace the component, reverse the removal procedure.

Install the PCI riser cage

> ⚠ **WARNING:** To reduce the risk of personal injury, electric shock, or damage to the equipment, remove the power cord to remove power from the server. The front panel Power On/Standby button does not completely shut off system power. Portions of the power supply and some internal circuitry remain active until AC power is removed.

1. Power down the server (on page 21).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Extend the server from the rack (on page 21).
4. Remove the access panel (on page 22).

5. Install the PCI riser cage.

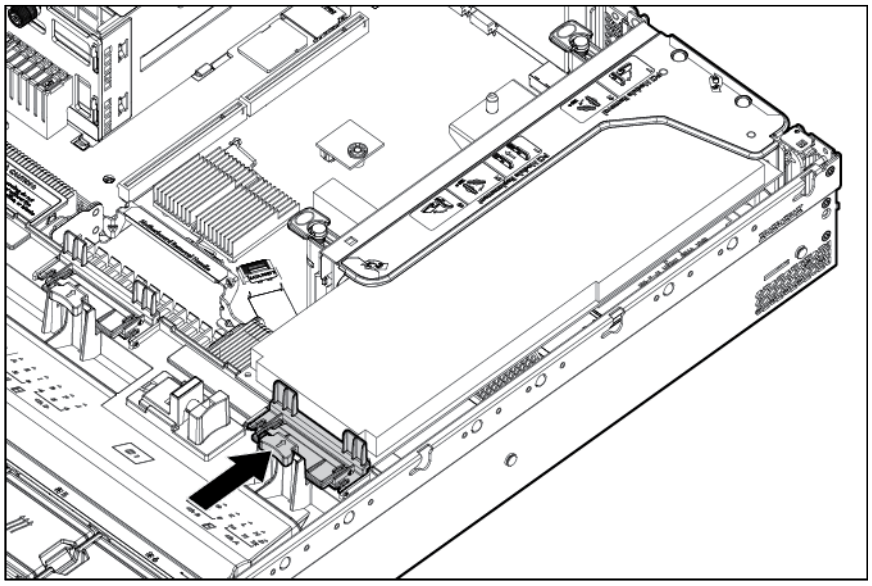


6. Install the access panel (on page 23).
7. Install the server into the rack ("Installing the server into the rack" on page 35).
8. Connect each power cord to the server.
9. Connect each power cord to the power source.
10. Power up the server (on page 21).

Secure the full-length expansion board retainer

1. Power down the server (on page 21).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Extend the server from the rack (on page 21).
4. Remove the access panel (on page 22).
5. Install a full-length expansion board ("Installing a full-length expansion board" on page 64).
6. Install the PCI riser cage (on page 27).

7. Secure the full-length expansion board retainer.



8. Install the access panel (on page 23).
9. Install the server into the rack ("Installing the server into the rack" on page 35).
10. Connect each power cord to the server.
11. Connect each power cord to the power source.
12. Power up the server (on page 21).

Remove the air baffle

CAUTION: For proper cooling do not operate the server without the access panel, baffles, expansion slot covers, or blanks installed. If the server supports hot-plug components, minimize the amount of time the access panel is open.

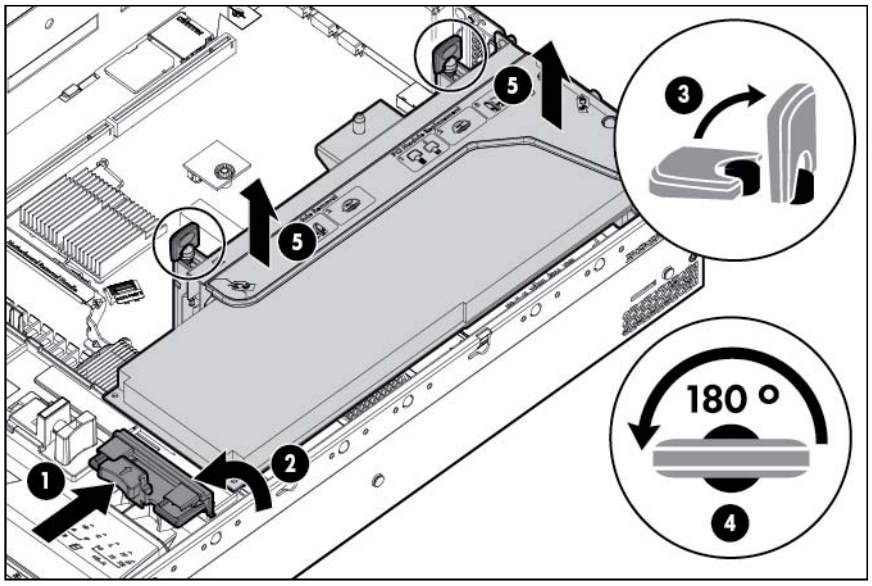
To remove the component:

1. Power down the server (on page 21).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Extend or remove the server from the rack ("Extend the server from the rack" on page 21).
4. Remove the access panel (on page 22).

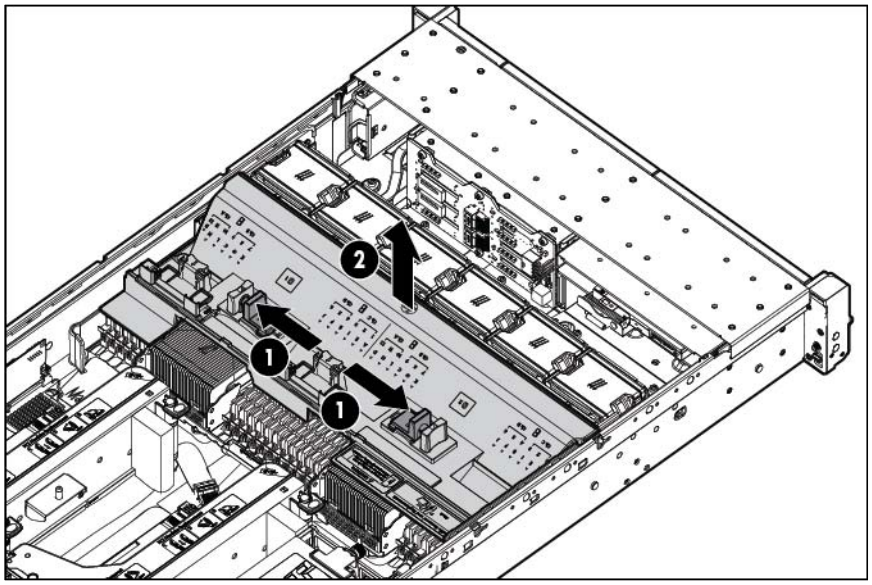
CAUTION: Do not detach the cable that connects the battery pack to the cache module. Detaching the cable causes any unsaved data in the cache module to be lost.

IMPORTANT: It is necessary to remove the PCI riser cage only if there is a full-length expansion board installed.

5. Release the full-length expansion board retainer, and then remove the PCI riser cage.



6. Remove the air baffle.



To replace the component, reverse the removal procedure.

Setup

Optional installation services

Delivered by experienced, certified engineers, HP Care Pack services help you keep your servers up and running with support packages tailored specifically for HP ProLiant systems. HP Care Packs let you integrate both hardware and software support into a single package. A number of service level options are available to meet your needs.

HP Care Pack Services offer upgraded service levels to expand your standard product warranty with easy-to-buy, easy-to-use support packages that help you make the most of your server investments. Some of the Care Pack services are:

- Hardware support
  - 6-Hour Call-to-Repair
  - 4-Hour 24x7 Same Day
  - 4-Hour Same Business Day
- Software support
  - Microsoft®
  - Linux
  - HP ProLiant Essentials (HP SIM and RDP)
  - VMWare
- Integrated hardware and software support
  - Critical Service
  - Proactive 24
  - Support Plus
  - Support Plus 24
- Startup and implementation services for both hardware and software

For more information on HP Care Pack Services, see the HP website (http://www.hp.com/services/carepack).

Rack planning resources

The rack resource kit ships with all HP branded or Compaq branded 9000, 10000, and H9 series racks. For more information on the content of each resource, see the rack resource kit documentation.

Optimum environment

When installing the server in a rack, select a location that meets the environmental standards described in this section.

Space and airflow requirements

To allow for servicing and adequate airflow, observe the following space and airflow requirements when deciding where to install a rack:

- Leave a minimum clearance of 63.5 cm (25 in) in front of the rack.
- Leave a minimum clearance of 76.2 cm (30 in) behind the rack.
- Leave a minimum clearance of 121.9 cm (48 in) from the back of the rack to the back of another rack or row of racks.

HP servers draw in cool air through the front door and expel warm air through the rear door. Therefore, the front and rear rack doors must be adequately ventilated to allow ambient room air to enter the cabinet, and the rear door must be adequately ventilated to allow the warm air to escape from the cabinet.

CAUTION: To prevent improper cooling and damage to the equipment, do not block the ventilation openings.

When vertical space in the rack is not filled by a server or rack component, the gaps between the components cause changes in airflow through the rack and across the servers. Cover all gaps with blanking panels to maintain proper airflow.

CAUTION: Always use blanking panels to fill empty vertical spaces in the rack. This arrangement ensures proper airflow. Using a rack without blanking panels results in improper cooling that can lead to thermal damage.

The 9000 and 10000 Series Racks provide proper server cooling from flow-through perforations in the front and rear doors that provide 64 percent open area for ventilation.

CAUTION: When using a Compaq branded 7000 series rack, install the high airflow rack door insert (PN 327281-B21 for 42U rack, PN 157847-B21 for 22U rack) to provide proper front-to-back airflow and cooling.

CAUTION: If a third-party rack is used, observe the following additional requirements to ensure adequate airflow and to prevent damage to the equipment:

- Front and rear doors—If the 42U rack includes closing front and rear doors, you must allow 5,350 sq cm (830 sq in) of holes evenly distributed from top to bottom to permit adequate airflow (equivalent to the required 64 percent open area for ventilation).
- Side—The clearance between the installed rack component and the side panels of the rack must be a minimum of 7 cm (2.75 in).

IMPORTANT: The HP ProLiant DL388p Gen8 Server cable management arm is not supported on Compaq branded 7000 series racks.

Temperature requirements

To ensure continued safe and reliable equipment operation, install or position the system in a well-ventilated, climate-controlled environment.

The maximum recommended ambient operating temperature (TMRA) for most server products is 35°C (95°F). The temperature in the room where the rack is located must not exceed 35°C (95°F).

CAUTION: To reduce the risk of damage to the equipment when installing third-party options:

- Do not permit optional equipment to impede airflow around the server or to increase the internal rack temperature beyond the maximum allowable limits.
- Do not exceed the manufacturer's TMRA.

Power requirements

Installation of this equipment must comply with local and regional electrical regulations governing the installation of information technology equipment by licensed electricians. This equipment is designed to operate in installations covered by NFPA 70, 1999 Edition (National Electric Code) and NFPA-75, 1992 (code for Protection of Electronic Computer/Data Processing Equipment). For electrical power ratings on options, refer to the product rating label or the user documentation supplied with that option.

WARNING: To reduce the risk of personal injury, fire, or damage to the equipment, do not overload the AC supply branch circuit that provides power to the rack. Consult the electrical authority having jurisdiction over wiring and installation requirements of your facility.

CAUTION: Protect the server from power fluctuations and temporary interruptions with a regulating uninterruptible power supply (UPS). This device protects the hardware from damage caused by power surges and voltage spikes and keeps the system in operation during a power failure.

When installing more than one server, you may need to use additional power distribution devices to safely provide power to all devices. Observe the following guidelines:

- Balance the server power load between available AC supply branch circuits.
- Do not allow the overall system AC current load to exceed 80 percent of the branch circuit AC current rating.
- Do not use common power outlet strips for this equipment.
- Provide a separate electrical circuit for the server.

Electrical grounding requirements

The server must be grounded properly for proper operation and safety. In the United States, you must install the equipment in accordance with NFPA 70, 1999 Edition (National Electric Code), Article 250, as well as any local and regional building codes. In Canada, you must install the equipment in accordance with Canadian Standards Association, CSA C22.1, Canadian Electrical Code. In all other countries, you must install the equipment in accordance with any regional or national electrical wiring codes, such as the International Electrotechnical Commission (IEC) Code 364, parts 1 through 7. Furthermore, you must be sure that all power distribution devices used in the installation, such as branch wiring and receptacles, are listed or certified grounding-type devices.

Because of the high ground-leakage currents associated with multiple servers connected to the same power source, HP recommends the use of a PDU that is either permanently wired to the building's branch circuit or includes a nondetachable cord that is wired to an industrial-style plug. NEMA locking-style plugs or those complying with IEC 60309 are considered suitable for this purpose. Using common power outlet strips for the server is not recommended.

Connecting a DC power cable to a DC power source

WARNING: To reduce the risk of electric shock or energy hazards:

- This equipment must be installed by trained service personnel, as defined by the NEC and IEC 60950-1, Second Edition, the standard for Safety of Information Technology Equipment.
- Connect the equipment to a reliably grounded SELV source. An SELV source is a secondary circuit that is designed so normal and single fault conditions do not cause the voltages to exceed a safe level (60 V direct current).
- The branch circuit overcurrent protection must be rated 20A.

WARNING: When installing a DC power supply, the ground wire must be connected before the positive or negative leads.

WARNING: Remove power from the power supply before performing any installation steps or maintenance on the power supply.

CAUTION: The server equipment connects the earthed conductor of the DC supply circuit to the earthing conductor at the equipment. For more information, see the HP 750W Common Slot -48V DC Input Hot-Plug Power Supply Kit Installation Instructions.

CAUTION: If the DC connection between the earthed conductor of the DC supply circuit and the earthing conductor at the server equipment, the following conditions must be met:

- This equipment must be connected directly to the DC supply system earthing electrode conductor or to a bonding jumper from an earthing terminal bar or bus to which the DC supply system earthing electrode conductor is connected.
- This equipment should be located in the same immediate area (such as adjacent cabinets) as any other equipment that has a connection between the earthed conductor of the same DC supply circuit and the earthing conductor, and also the point of earthing of the DC system. The DC system should be earthed elsewhere.
- The DC supply source is to be located within the same premises as the equipment.
- Switching or disconnecting devices should not be in the earthed circuit conductor between the DC source and the point of connection of the earthing electrode conductor.

To connect a DC power cable to a DC power source:

1. Cut the DC power cord ends no shorter than 150 cm (59.06 in).
2. If the power source requires ring tongues, use a crimping tool to install the ring tongues on the power cord wires.

IMPORTANT: The ring tongues must be UL approved and accommodate 12 gauge wires.

IMPORTANT: The minimum nominal thread diameter of a pillar or stud type terminal must be 3.5 mm (0.138 in); the diameter of a screw type terminal must be 4.0 mm (0.157 in).

3. Stack each same-colored pair of wires and then attach them to the same power source. The power cord consists of three wires (black, red, and green).

For more information, see the *HP 750W Common Slot -48V DC Input Hot-Plug Power Supply Installation Instructions*.

Rack warnings

⚠ **WARNING:** To reduce the risk of personal injury or damage to the equipment, be sure that:

- The leveling jacks are extended to the floor.
- The full weight of the rack rests on the leveling jacks.
- The stabilizing feet are attached to the rack if it is a single-rack installation.
- The racks are coupled together in multiple-rack installations.
- Only one component is extended at a time. A rack may become unstable if more than one component is extended for any reason.

⚠ **WARNING:** To reduce the risk of personal injury or equipment damage when unloading a rack:

- At least two people are needed to safely unload the rack from the pallet. An empty 42U rack can weigh as much as 115 kg (253 lb), can stand more than 2.1 m (7 ft) tall, and might become unstable when being moved on its casters.
- Never stand in front of the rack when it is rolling down the ramp from the pallet. Always handle the rack from both sides.

Identifying the contents of the server shipping carton

Unpack the server shipping carton and locate the materials and documentation necessary for installing the server. All the rack mounting hardware necessary for installing the server into the rack is included with the rack or the server.

The contents of the server shipping carton include:

- Server
- Power cord
- Hardware documentation, Documentation CD, and software products
- Rack-mounting hardware

In addition to the supplied items, you may need:

- Operating system or application software
- Hardware options

Installing hardware options

Install any hardware options before initializing the server. For options installation information, refer to the option documentation. For server-specific information, refer to "Hardware options installation (on page 39)."

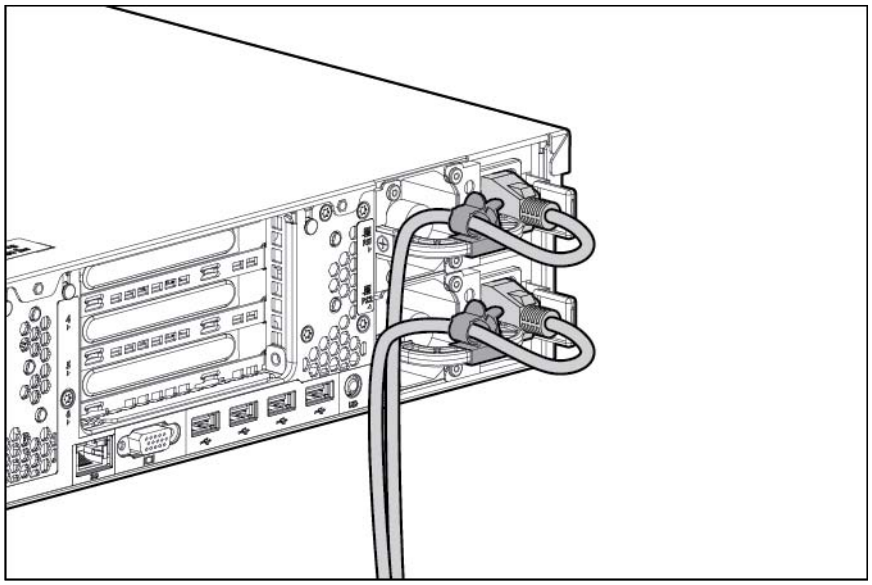
Installing the server into the rack

△ **CAUTION:** Always plan the rack installation so that the heaviest item is on the bottom of the rack. Install the heaviest item first, and continue to populate the rack from the bottom to the top.

1. Install the server and cable management arm into the rack. For more information, see the installation instructions that ship with the 2U Quick Deploy Rail System.
2. Connect peripheral devices to the server. For information on identifying connectors, see "Rear panel components (on page 12)."

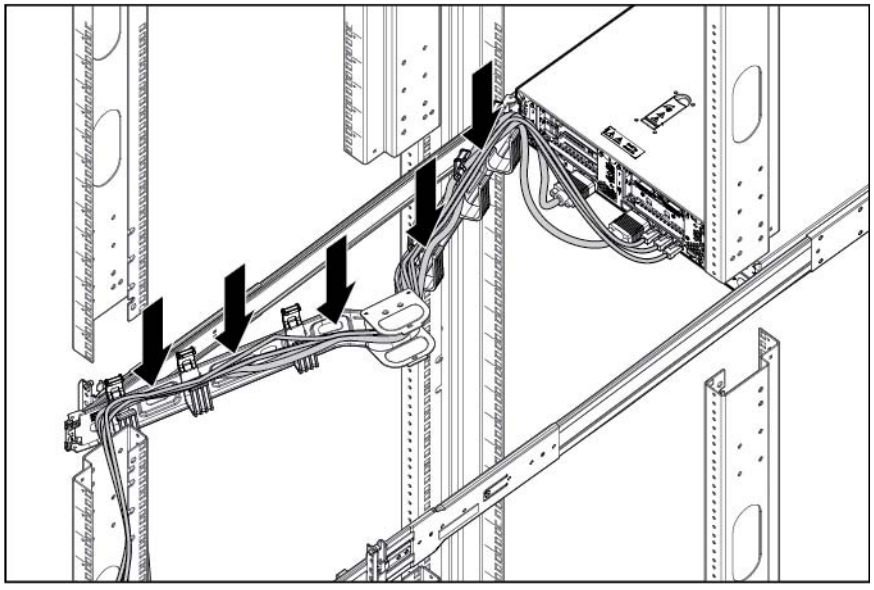
WARNING: To reduce the risk of electric shock, fire, or damage to the equipment, do not plug telephone or telecommunications connectors into RJ-45 connectors.

3. Connect the power cord to the rear of the server.
4. Install the power cord anchors.



5. Secure the cables to the cable management arm.

IMPORTANT: When using cable management arm components, be sure to leave enough slack in each of the cables to prevent damage to the cables when the server is extended from the rack.



6. Connect the power cord to the AC power source.

⚠ **WARNING:** To reduce the risk of electric shock or damage to the equipment:

- Do not disable the power cord grounding plug. The grounding plug is an important safety feature.
- Plug the power cord into a grounded (earthed) electrical outlet that is easily accessible at all times.
- Unplug the power cord from the power supply to disconnect power to the equipment.
- Do not route the power cord where it can be walked on or pinched by items placed against it. Pay particular attention to the plug, electrical outlet, and the point where the cord extends from the server.

Installing the operating system

This ProLiant server does not ship with provisioning media. Everything needed to manage and install the system software and firmware is preloaded on the server.

To operate properly, the server must have a supported operating system. For the latest information on operating system support, see the HP website (http://www.hp.com/go/supportos).

To install an operating system on the server, use one of the following methods:

- Intelligent Provisioning—The iLO Management Engine is a new feature on ProLiant servers that contains Intelligent Provisioning for embedded deployment, updating, and provisioning capabilities. Intelligent Provisioning can configure the server and install an operating system, eliminating the need for SmartStart CDs and Smart Update Firmware DVDs.

  To install an operating system on the server with Intelligent Provisioning (local or remote):

  a. Connect the Ethernet cable, and then power on the server.
  b. During server POST, press the **F10** key.
  c. Complete the initial Preferences and Registration portion of Intelligent Provisioning (on page 91).
  d. At the 1 Start screen, click the **Configure and Install** button.
  e. To finish the installation, follow the on-screen prompts. An Internet connection is required to update the firmware and systems software.

- Remote deployment installation—To remotely deploy an operating system, use Insight Control server deployment for an automated solution.

For additional system software and firmware updates, download the HP Service Pack for ProLiant from the HP website (http://www.hp.com/go/spp/download). Software and firmware must be updated before using the server for the first time, unless any installed software or components require an older version. For more information, see Keeping the system current (on page 99).

The Smart Update Firmware DVD ISO is also available at the download tab on the HP website (http://www.hp.com/go/foundation).

For more information on using these installation methods, see the HP website (http://www.hp.com/go/ilo).

Powering on and selecting boot options

1. Connect the Ethernet cable and press the Power On/Standby button.
2. During the initial boot:

- To modify the server configuration ROM default settings, press **F9** when prompted from the start up sequence to enter the RBSU. By default, RBSU runs in the English language.
- If you do not need to modify the server configuration and are ready to install the system software, press **F10** to access Intelligent Provisioning.

  NOTE: If an HP Smart Array controller has been added or is embedded in the system, the controller defaults to a RAID configuration based on the size and number of hard drives installed. For more information on modifying the controller default settings, see the documentation on the Documentation CD.

For more information on automatic configuration, see the *HP ROM-Based Setup Utility User Guide* on the Documentation CD or the iLO Management Engine Information Library (http://www.hp.com/go/ilomgmtengine/docs).

Registering the server

To register the server, refer to the HP Registration website (http://register.hp.com).

Hardware options installation

Introduction

If more than one option is being installed, read the installation instructions for all the hardware options and identify similar steps to streamline the installation process.

WARNING: To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

CAUTION: To prevent damage to electrical components, properly ground the server before beginning any installation procedure. Improper grounding can cause electrostatic discharge.

Processor and fan option

The server supports single- and dual-processor operation.

CAUTION: To avoid damage to the processor and system board, only authorized personnel should attempt to replace or install the processor in this server.

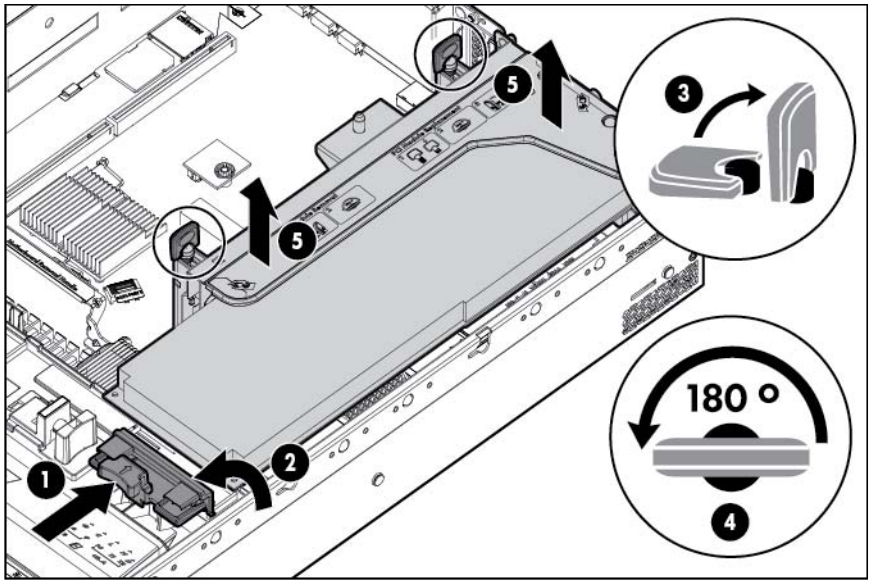
CAUTION: To prevent possible server malfunction and damage to the equipment, multiprocessor configurations must contain processors with the same part number.

IMPORTANT: If installing a processor with a faster speed, update the system ROM before installing the processor.

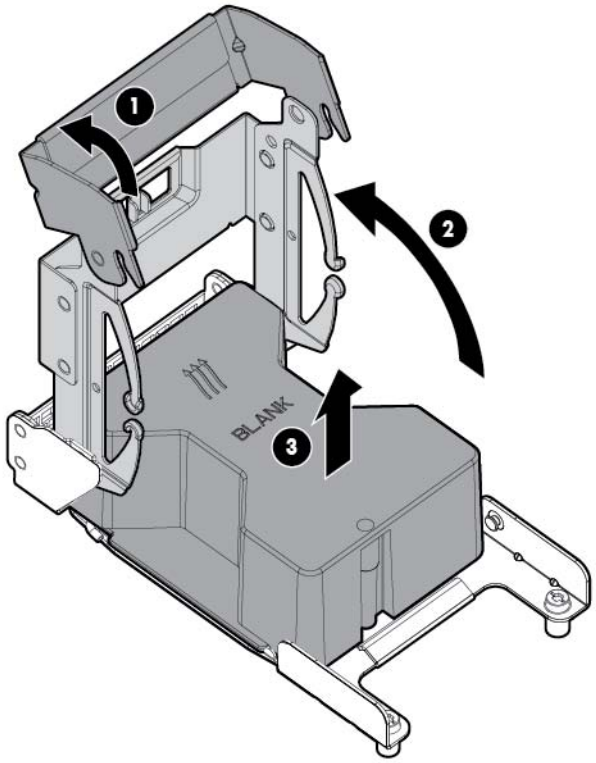
To install a processor:

1. Power down the server (on page 21).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Extend the server from the rack (on page 21).
4. Remove the access panel (on page 22).

5. If any full-length PCI riser boards are installed, release the full-length expansion board retainer, and then remove the PCI riser cage.

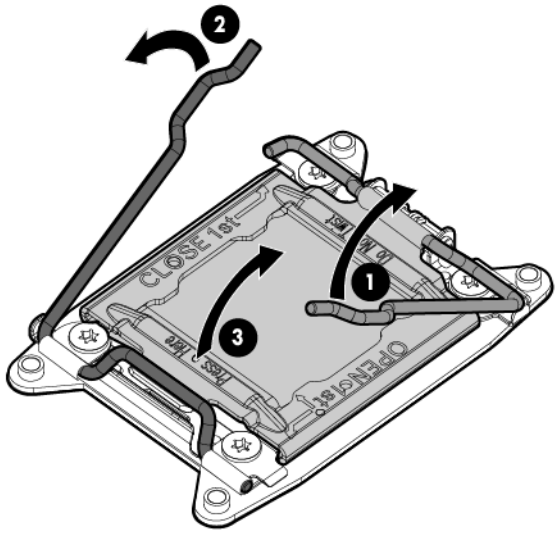


6. Remove the air baffle (on page 29).
7. Open the heatsink retaining bracket, and then remove the blank.

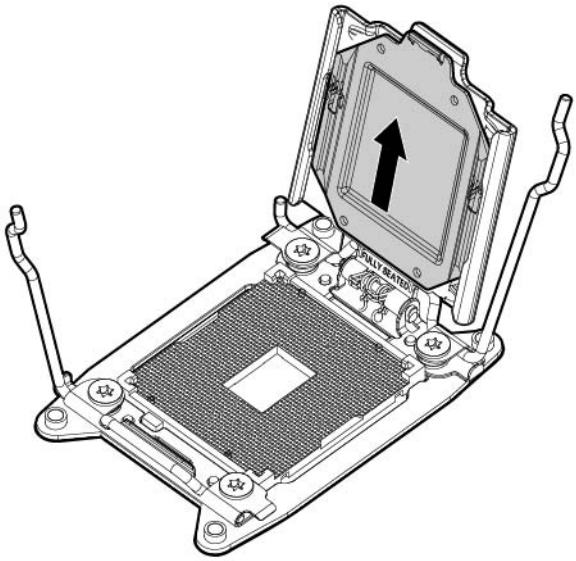


△ **CAUTION:** The pins on the processor socket are very fragile. Any damage to them may require replacing the system board.

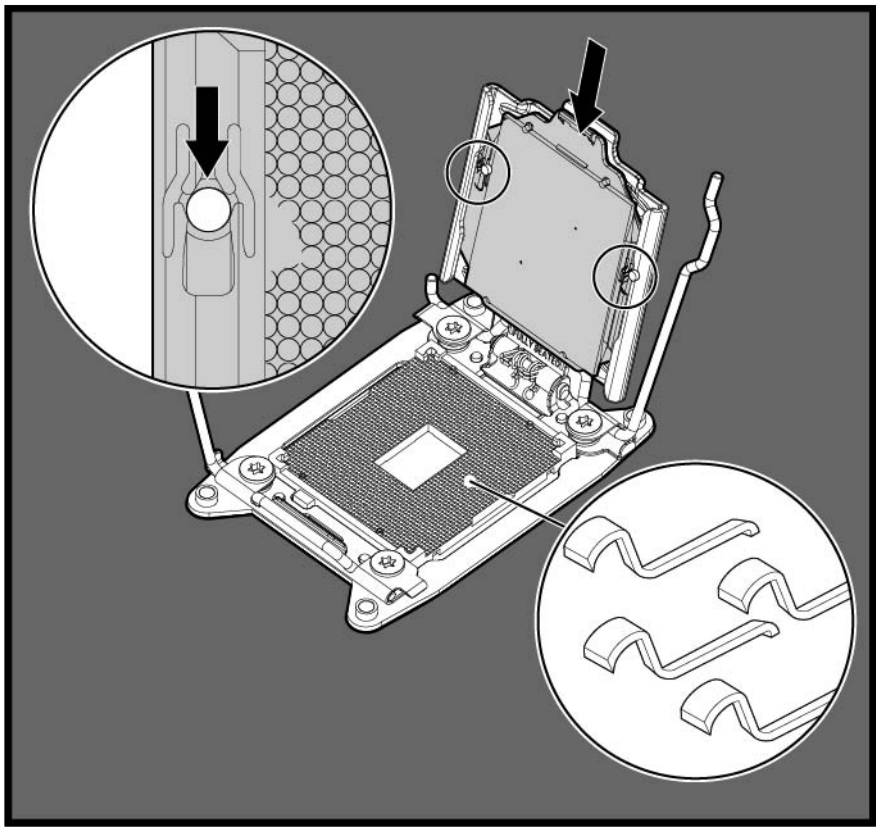
8. Open each of the processor locking levers in the order indicated, and then open the processor retaining bracket.



9. Remove the clear processor socket cover. Retain the processor socket cover for future use.



10. Install the processor. Verify that the processor is fully seated in the processor retaining bracket by visually inspecting the processor installation guides on either side of the processor. **THE PINS ON THE SYSTEM BOARD ARE VERY FRAGILE AND EASILY DAMAGED.**

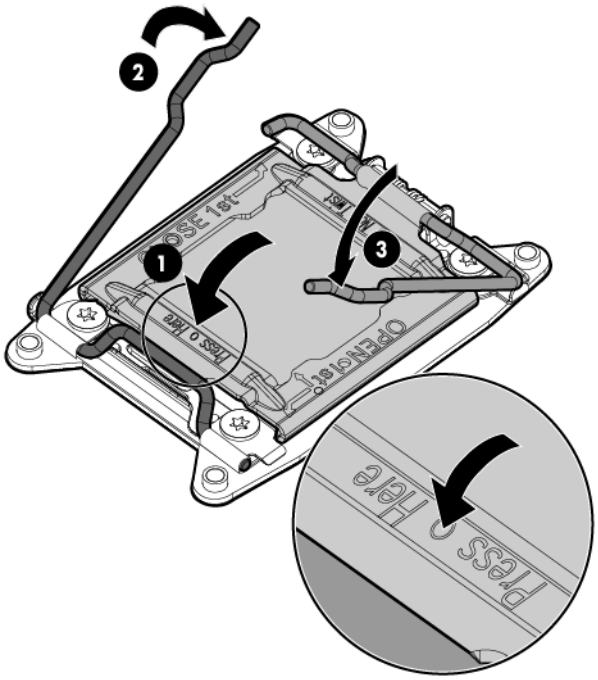


△ **CAUTION: THE PINS ON THE SYSTEM BOARD ARE VERY FRAGILE AND EASILY DAMAGED.** To avoid damage to the system board, do not touch the processor or the processor socket contacts.

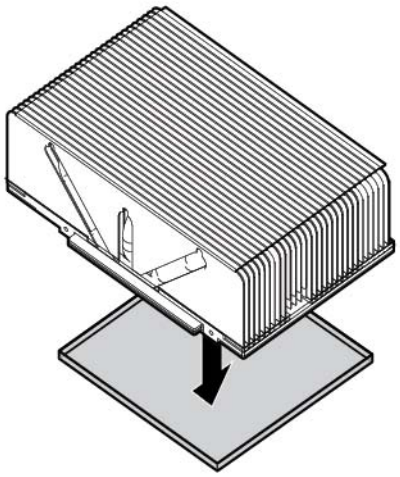
11. Close the processor retaining bracket. When the processor is installed properly inside the processor retaining bracket, the processor retaining bracket clears the flange on the front of the socket.

△ **CAUTION:** Do not press down on the processor. Pressing down on the processor may cause damage to the processor socket and the system board. Press only in the area indicated on the processor retaining bracket.

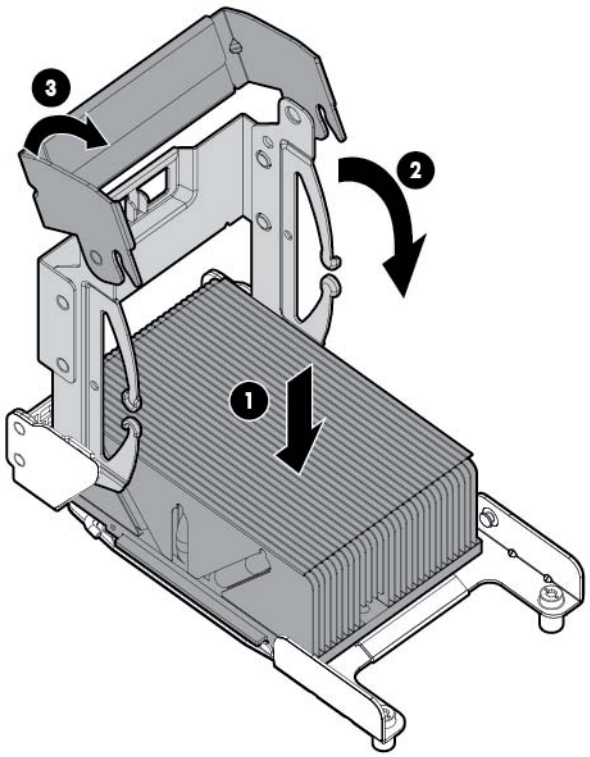
12. Press and hold the processor retaining bracket in place, and then close each processor locking lever. Press only in the area indicated on the processor retaining bracket.



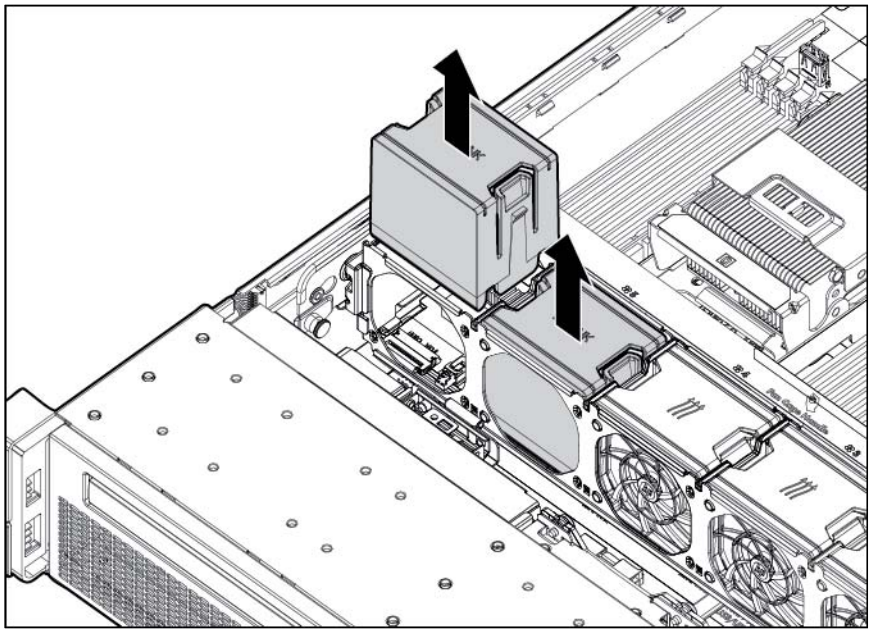
13. Remove the thermal interface protective cover from the heatsink.



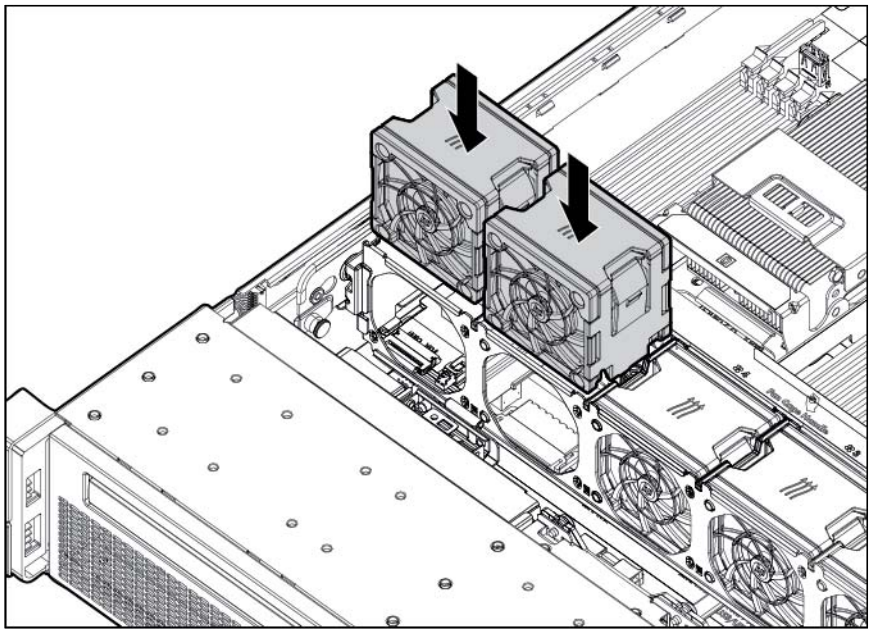
14. Install the heatsink.



15. Remove the two fan blanks.

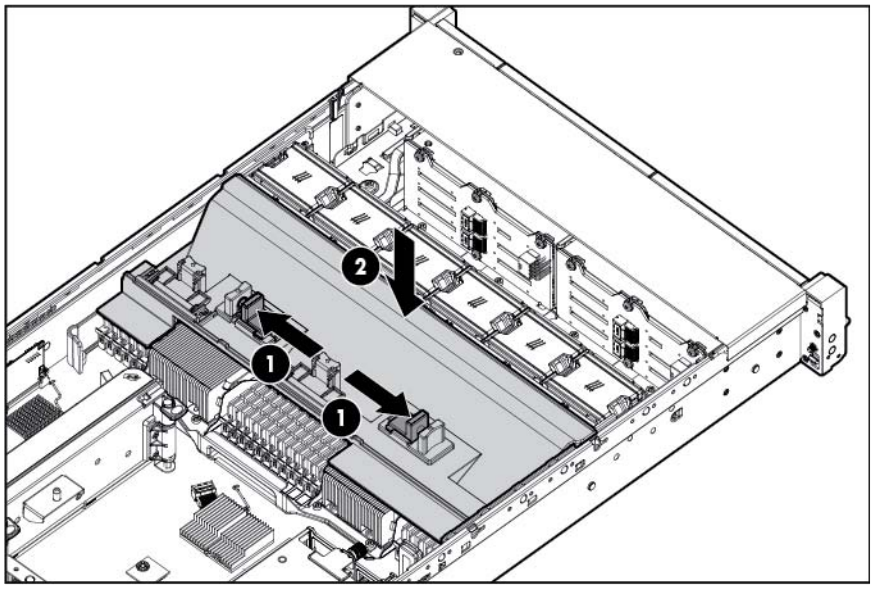


16. Install the two additional fans included with the processor.



You can install memory ("Installing a DIMM" on page 51) on the second processor. HP recommends balancing memory between both processors for improved performance. For more information on memory configurations, see "Memory Options (on page 46)."

17. Install the air baffle ("Remove the air baffle" on page 29).



18. Install any full-length expansion boards ("Installing a full-length expansion board" on page 64), if previously removed.
19. Install the access panel (on page 23).
20. Install the server into the rack ("Installing the server into the rack" on page 35).
21. Connect each power cord to the server.
22. Connect each power cord to the power source.
23. Power up the server (on page 21).

Memory options

IMPORTANT: This server does not support mixing LRDIMMs, RDIMMs, or UDIMMs. Attempting to mix any combination of these DIMMs can cause the server to halt during BIOS initialization.

The memory subsystem in this server can support LRDIMMs, RDIMMs, or UDIMMs:

- UDIMMs represent the most basic type of memory module and offer lower latency in one DIMM per channel configurations and (relatively) low power consumption, but are limited in capacity.
- RDIMMs offer larger capacities than UDIMMs and include address parity protection.
- LRDIMMs support higher densities than single- and dual-rank RDIMMs, and higher speeds than quad-rank RDIMMs. This support enables you to install more high capacity DIMMs, resulting in higher system capacities and higher bandwidth.

All types are referred to as DIMMs when the information applies to all types. When specified as LRDIMM, RDIMM, or UDIMM, the information applies to that type only. All memory installed in the server must be the same type.

The server supports the following DIMM speeds:

- Single- and dual-rank PC3-10600 (DDR-1333) RDIMMs operating at up to 1333 MT/s
- Single- and dual-rank PC3-12800 (DDR-1600) RDIMMs operating at up to 1600 MT/s
- Single- and dual-rank PC3-10600 (DDR-1333) UDIMMs operating at up to 1333 MT/s
- Quad-rank PC3L-10600 (DDR3-1333) LRDIMMs, operating as dual-rank DIMMs, at up to 1333 MT/s

Speed, voltage, and capacity

DIMM type	DIMM rank	DIMM capacity	Native speed (MT/s)	Voltage
RDIMM	Dual-rank	8 GB	1333	LV
RDIMM	Single-rank	8 GB	1600	STD
RDIMM	Dual-rank	16 GB	1333	LV
LRDIMM	Quad-rank	32 GB	1333	LV
UDIMM	Dual-rank	8 GB	1333	LV

Depending on the processor model, the number of DIMMs installed, and whether LRDIMMs, UDIMMs, or RDIMMs are installed, the memory clock speed can be reduced to 1333 or 1066 MT/s.

Populated DIMM speed (MT/s)

DIMM type	DIMM rank	1 DIMM per channel	2 DIMMs per channel	3 DIMMs per channel
RDIMM	Dual-rank (8 GB)	1333	1333	1066*
RDIMM	Single-rank (8 GB)	1600	1600	1066
RDIMM	Dual-rank (16 GB)	1333	1333	1066*
LRDIMM	Quad-rank (32 GB)	1333**	1333**	1066
UDIMM	Dual-rank (8 GB)	1333	1333†	—

* RDIMM supports 1.35V 3DPC at 1066. Third-party memory supports 1.5V 3DPC at 1066 MT/s.
** LRDIMM enables 3 DIMMs per channel. HP SmartMemory supports up to 3DPC at 1066 MT/s at 1.35V. Third-party memory supports 1.5V only.
† UDIMM is supported at 2DPC at 1333 MT/s using HP SmartMemory only. Third-party memory supports up to 2DPC at 1066 MT/s.

HP SmartMemory

HP SmartMemory, introduced for Gen8 servers, authenticates and unlocks certain features available only on HP Qualified memory and verifies whether installed memory has passed HP qualification and test processes. Qualified memory is performance-tuned for HP ProLiant and BladeSystem servers and provides future enhanced support through HP Active Health and manageability software.

Certain performance features are unique with HP SmartMemory. HP SmartMemory 1.35V DDR3-1333 Registered memory is engineered to achieve the same performance level as 1.5V memory. For example, while the industry supports DDR3-1333 RDIMM at 1.5V, this Gen8 server supports DDR3-1333 RDIMM up to 3 DIMMs per channel at 1066 MT/s running at 1.35V. This equates to up to 20% less power at the DIMM level with no performance penalty. In addition, the industry supports UDIMM at 2 DIMMs per channel at 1066 MT/s. HP SmartMemory supports 2 DIMMs per channel at 1333 MT/s, or 25% greater bandwidth.

Memory subsystem architecture

The memory subsystem in this server is divided into channels. Each processor supports four channels, and each channel supports three DIMM slots, as shown in the following table.

Channel	Population order	Slot number
1	A E I	12 11 10
2	B F J	9 8 7
3	C G K	1 2 3
4	D H L	4 5 6

For the location of the slot numbers, see "DIMM slot locations (on page 16)."

This multi-channel architecture provides enhanced performance in Advanced ECC mode. This architecture also enables Lockstep and Online Spare Memory modes.

DIMM slots in this server are identified by number and by letter. Letters identify the population order. Slot numbers indicate the DIMM slot ID for spare replacement.

Single-, dual-, and quad-rank DIMMs

To understand and configure memory protection modes properly, an understanding of single-, dual-, and quad-rank DIMMs is helpful. Some DIMM configuration requirements are based on these classifications.

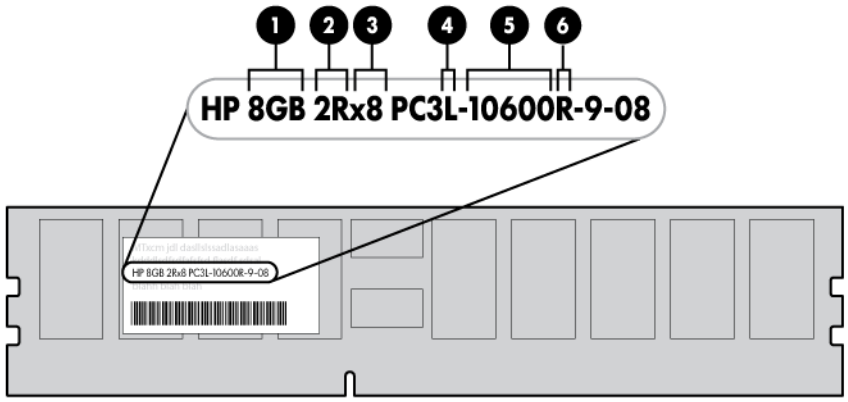
A single-rank DIMM has one set of memory chips that is accessed while writing to or reading from the memory. A dual-rank DIMM is similar to having two single-rank DIMMs on the same module, with only one rank accessible at a time. A quad-rank DIMM is, effectively, two dual-rank DIMMs on the same module. Only one rank is accessible at a time. The server memory control subsystem selects the proper rank within the DIMM when writing to or reading from the DIMM.

Dual- and quad-rank DIMMs provide the greatest capacity with the existing memory technology. For example, if current DRAM technology supports 8-GB single-rank DIMMs, a dual-rank DIMM would be 16 GB, and a quad-rank DIMM would be 32 GB.

LRDIMMs are labeled as quad-rank DIMMs; however, they function more like dual-rank DIMMs. There are four ranks of DRAM on the DIMM, but the LRDIMM buffer creates an abstraction that allows the DIMM to appear as a dual-rank DIMM to the system. The LRDIMM buffer also isolates the electrical loading of the DRAM from the system to allow for faster operation. These two changes allow the system to support up to three LRDIMMs per memory channel, providing for up to 50% greater memory capacity and higher memory operating speed compared to quad-rank RDIMMs.

DIMM identification

To determine DIMM characteristics, use the label attached to the DIMM and the following illustration and table.



Item	Description	Definition
1	Size	—
2	Rank	1R = Single-rank 2R = Dual-rank 4R = Quad-rank
3	Data width	x4 = 4-bit x8 = 8-bit
4	Voltage rating	L = Low voltage (1.35v) U = Ultra low voltage (1.25v) Blank or omitted = Standard
5	Memory speed	12800 = 1600-MT/s 10600 = 1333-MT/s 8500 = 1066-MT/s
6	DIMM type	R = RDIMM (registered) E = UDIMM (unbuffered with ECC) L = LRDIMM (load reduced)

For the latest supported memory information, see the QuickSpecs on the HP website (http://h18000.www1.hp.com/products/quickspecs/ProductBulletin.html). At the website, choose the geographic region, and then locate the product by name or product category.

Memory configurations

To optimize server availability, the server supports the following AMP modes:

- Advanced ECC—provides up to 4-bit error correction and enhanced performance over Lockstep mode. This mode is the default option for this server.
- Online spare memory—provides protection against failing or degraded DIMMs. Certain memory is reserved as spare, and automatic failover to spare memory occurs when the system detects a DIMM that is degrading. This allows DIMMs that have a higher probability of receiving an uncorrectable memory error (which would result in system downtime) to be removed from operation.

Advanced Memory Protection options are configured in RBSU. If the requested AMP mode is not supported by the installed DIMM configuration, the server boots in Advanced ECC mode. For more information, see "HP ROM-Based Setup Utility (on page 94)."

The server also can operate in independent channel mode or combined channel mode (lockstep). When running in lockstep mode, you gain reliability in one of two ways:

- If running with UDIMMs (built with x8 DRAM devices), the system can survive a complete DRAM failure (SDDC). In independent channel mode, this failure would be an uncorrectable error.
- If running with RDIMM (built with x4 DRAM devices), the system can survive the complete failure of two DRAM devices (DDDC). Running in independent mode, the server can only survive the complete failure of a single DRAM device (SDDC).

Maximum capacity

DIMM type	DIMM rank	One processor	Two processors
RDIMM	Single-rank	96 GB	192 GB
RDIMM	Dual-rank	192 GB	384 GB
LRDIMM	Quad-rank	384 GB	768 GB
UDIMM	Single-rank	32 GB	64 GB
UDIMM	Dual-rank	64 GB	128 GB

For the latest memory configuration information, see the QuickSpecs on the HP website (http://www.hp.com).

Advanced ECC memory configuration

Advanced ECC memory is the default memory protection mode for this server. Standard ECC can correct single-bit memory errors and detect multi-bit memory errors. When multi-bit errors are detected using Standard ECC, the error is signaled to the server and causes the server to halt.

Advanced ECC protects the server against some multi-bit memory errors. Advanced ECC can correct both single-bit memory errors and 4-bit memory errors if all failed bits are on the same DRAM device on the DIMM.

Advanced ECC provides additional protection over Standard ECC because it is possible to correct certain memory errors that would otherwise be uncorrected and result in a server failure. Using HP Advanced Memory Error Detection technology, the server provides notification when a DIMM is degrading and has a higher probability of uncorrectable memory error.

Online Spare memory configuration

Online spare memory provides protection against degraded DIMMs by reducing the likelihood of uncorrected memory errors. This protection is available without any operating system support.

Online spare memory protection dedicates one rank of each memory channel for use as spare memory. The remaining ranks are available for OS and application use. If correctable memory errors occur at a rate higher than a specific threshold on any of the non-spare ranks, the server automatically copies the memory contents of the degraded rank to the online spare rank. The server then deactivates the failing rank and automatically switches over to the online spare rank.

Lockstep memory configuration

Lockstep mode provides protection against multi-bit memory errors that occur on the same DRAM device. Lockstep mode can correct any single DRAM device failure on x4 and x8 DIMM types. The DIMMs in each channel must have identical HP part numbers.

General DIMM slot population guidelines

Observe the following guidelines for all AMP modes:

- Install DIMMs only if the corresponding processor is installed.
- When two processors are installed, balance the DIMMs across the two processors.
- White DIMM slots denote the first slot of a channel (Ch 1-A, Ch 2-B, Ch 3-C, Ch 4-D).
- Do not mix LRDIMMs, UDIMMs, or RDIMMs.
- Do not install more than two UDIMMs per channel. UDIMMs should not be installed in slots Ch 1-I, Ch 2-J, Ch 3-K, or Ch 4-L.
- When two processors are installed, install the DIMMs in sequential alphabetical order balanced between the two processors: P1-A, P2-A, P1-B, P2-B, P1-C, P2-C, and so on.

For detailed memory configuration rules and guidelines, use the Online DDR3 Memory Configuration Tool on the HP website (http://www.hp.com/go/ddr3memory-configurator).

DIMM speeds are supported as indicated in the following table.

Populated slots (per channel)	Rank	Speeds supported (MT/s)
1	Single- or dual-rank	1333, 1600
1	Quad-rank	1333
2	Single- or dual-rank	1333
3	Single- or dual-rank	1066

Advanced ECC population guidelines

For Advanced ECC mode configurations, observe the following guidelines:

- Observe the general DIMM slot population guidelines (on page 50).
- DIMMs may be installed individually.

Online spare population

For online spare memory mode configurations, observe the following guidelines:

- Observe the general DIMM slot population guidelines (on page 50).
- Each channel must have a valid online spare configuration.
- Each channel can have a different valid online spare configuration.
- Each populated channel must have a spare rank:
  - A single dual-rank DIMM is not a valid configuration.
  - LRDIMMs are treated as dual-rank DIMMs.

Lockstep Memory population guidelines

For Lockstep memory mode configurations, observe the following guidelines:

- Observe the general DIMM slot population guidelines (on page 50).
- DIMM configuration on all channels of a processor must be identical.
- In multi-processor configurations, each processor must have a valid Lockstep Memory configuration.
- In multi-processor configurations, each processor may have a different valid Lockstep Memory configuration.

Population order

For memory configurations with a single processor or multiple processors, populate the DIMM slots in the following order:

- LRDIMM: Sequentially in alphabetical order (A through L)
- RDIMM: Sequentially in alphabetical order (A through L)
- UDIMM: A through H, sequentially in alphabetical order. Do not populate DIMM slots I through L.

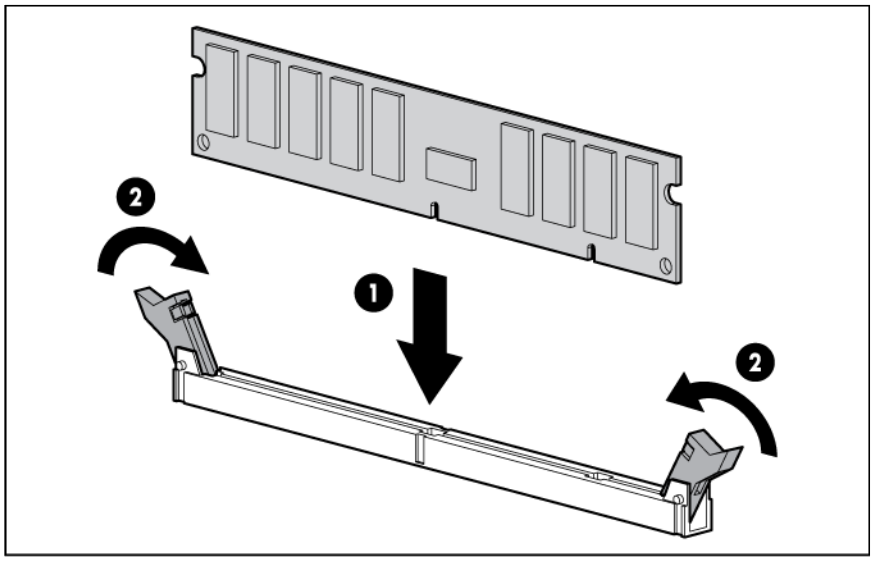
After installing the DIMMs, use RBSU to configure Advanced ECC, online spare, or lockstep memory support.

Installing a DIMM

The server supports up to 24 DIMMs. To install a DIMM:

1. Power down the server (on page 21).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Extend the server from the rack (on page 21).
4. Remove the access panel (on page 22).
5. Remove the air baffle (on page 29).
6. Open the DIMM slot latches.

7. Install the DIMM.



8. Install the access panel (on page 23).
9. Install the server into the rack ("Installing the server into the rack" on page 35).
10. Connect each power cord to the server.
11. Connect each power cord to the power source.
12. Power up the server (on page 21).

Use RBSU ("HP ROM-Based Setup Utility" on page 94) to configure the memory mode.

For more information about LEDs and troubleshooting failed DIMMs, see "Systems Insight Display LED combinations (on page 11)."

Hot-plug hard drive options

When adding hard drives to the server, observe the following general guidelines:

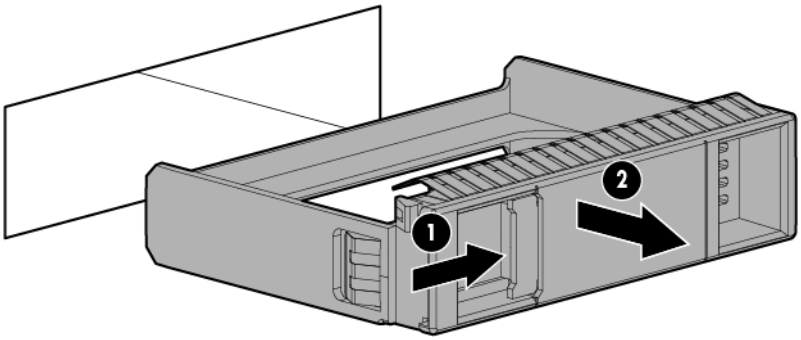
- The system automatically sets all device numbers.
- If only one hard drive is used, install it in the bay with the lowest device number.
- Drives should be the same capacity to provide the greatest storage space efficiency when drives are grouped together into the same drive array.

Installing a hot-plug SAS or SATA hard drive

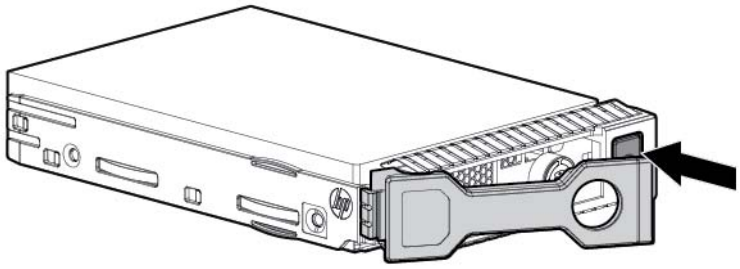
The server can support 8 SAS or SATA hard drives in a SFF or LFF configuration, or 16 drives in a SFF configuration with the optional hard drive cage ("Hard drive cage option" on page 68).

To install the component:

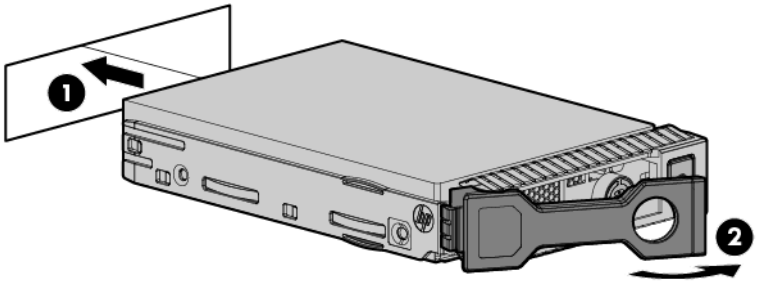
1. Remove the drive blank.



2. Prepare the drive.



3. Install the drive.



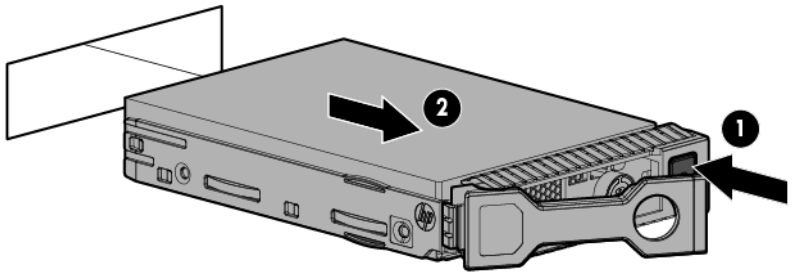
4. Determine the status of the drive from the drive LED definitions.

Removing a hot-plug SAS or SATA hard drive

CAUTION: For proper cooling do not operate the server without the access panel, baffles, expansion slot covers, or blanks installed. If the server supports hot-plug components, minimize the amount of time the access panel is open.

1. Determine the status of the hard drive from the hot-plug SAS hard drive LED combinations.
2. Back up all server data on the drive.

3. Remove the drive.



Controller options

The server ships with an embedded Smart Array P420i controller. For more information about the controller and its features, see the *HP Smart Array Controllers for HP ProLiant Servers User Guide* on the HP website (http://bizsupport2.austin.hp.com/bc/docs/support/SupportManual/c01608507/c01608507.pdf). To configure arrays, see the *Configuring Arrays on HP Smart Array Controllers Reference Guide* on the HP website (http://bizsupport1.austin.hp.com/bc/docs/support/SupportManual/c00729544/c00729544.pdf).

Upgrade options exist for the integrated array controller. For a list of supported options, see the QuickSpecs on the HP website (http://www.hp.com/support).

The server supports FBWC. FBWC consists of a cache module and a capacitor pack. The DDR cache module buffers and stores data being written by the controller. When the system is powered on, the capacitor pack charges fully in about 5 minutes. In the event of a system power failure, a fully charged capacitor pack provides power for up to 80 seconds. During that interval, the controller transfers the cached data from DDR memory to flash memory, where the data remains indefinitely or until a controller retrieves the data.

△ **CAUTION:** The cache module connector does not use the industry standard DDR3 mini DIMM pinout. Do not use this controller with cache modules designed for other controller models, because the controller can malfunction and you can lose data. Also, do not transfer this cache module to an unsupported controller model, because you can lose data.

△ **CAUTION:** To prevent a server malfunction or damage to the equipment, do not add or remove the battery pack while an array capacity expansion, RAID level migration, or stripe size migration is in progress.

△ **CAUTION:** After the server is powered down, wait 15 seconds and then check the amber LED before unplugging the cable from the cache module. If the amber LED blinks after 15 seconds, do not remove the cable from the cache module. The cache module is backing up data, and data is lost if the cable is detached.

IMPORTANT: The battery pack might have a low charge when installed. In this case, a POST error message is displayed when the server is powered up, indicating that the battery pack is temporarily disabled. No action is necessary on your part. The internal circuitry automatically recharges the batteries and enables the battery pack. This process might take up to four hours. During this time, the cache module functions properly, but without the performance advantage of the battery pack.

NOTE: The data protection and the time limit also apply if a power outage occurs. When power is restored to the system, an initialization process writes the preserved data to the hard drives.

Installing the flash-backed write cache module

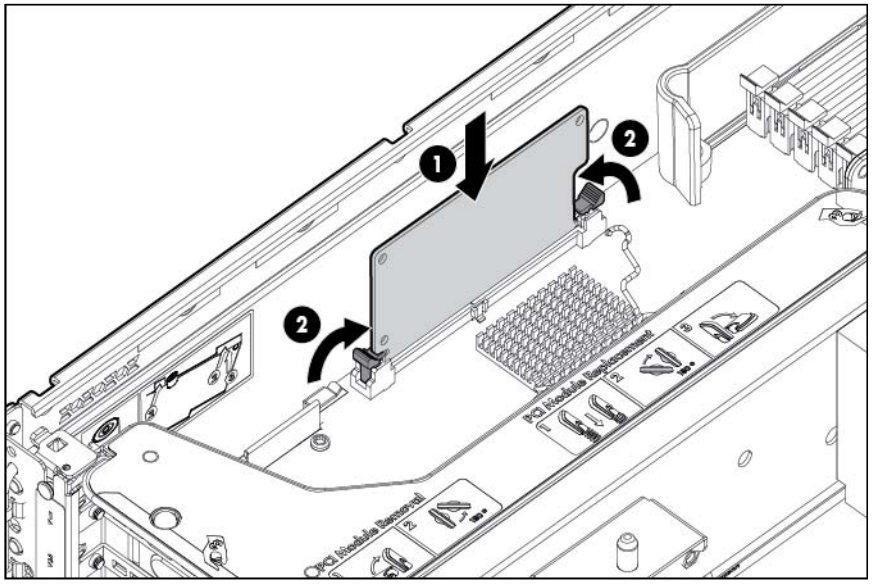
CAUTION: The cache module connector does not use the industry standard DDR3 mini DIMM pinout. Do not use this controller with cache modules designed for other controller models, because the controller can malfunction and you can lose data. Also, do not transfer this cache module to an unsupported controller model, because you can lose data.

To install the component:

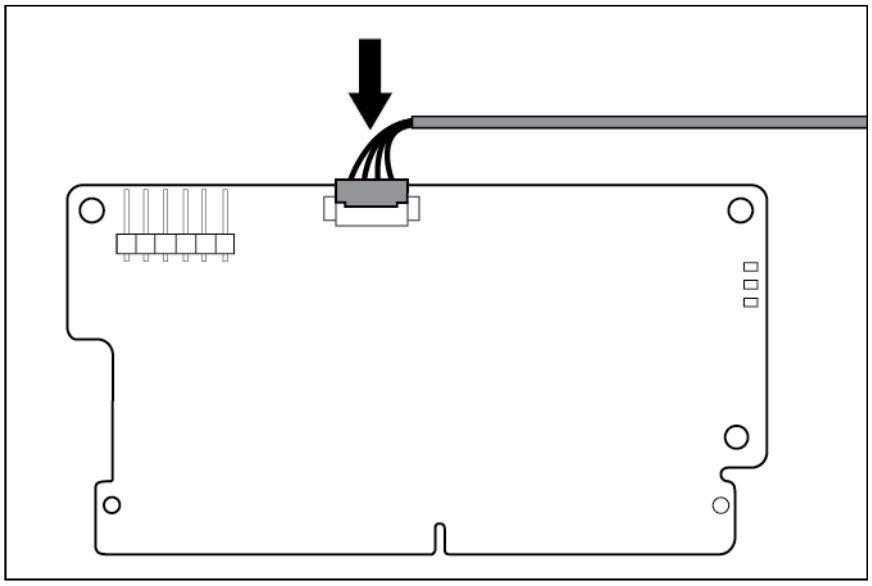
1. Back up all data.
2. Close all applications.

CAUTION: In systems that use external data storage, be sure that the server is the first unit to be powered down and the last to be powered back up. Taking this precaution ensures that the system does not erroneously mark the drives as failed when the server is powered up.

3. Power down the server (on page 21).
4. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
5. Extend the server from the rack (on page 21).
6. Remove the access panel (on page 22).
7. Install the cache module.



8. Connect the capacitor pack cable to the connector on the top of the cache module.



9. Install the access panel (on page 23).
10. Install the server into the rack ("Installing the server into the rack" on page 35).
11. Connect each power cord to the server.
12. Connect each power cord to the power source.
13. Power up the server (on page 21).

Installing the flash-backed write cache capacitor pack

△ **CAUTION:** The cache module connector does not use the industry standard DDR3 mini DIMM pinout. Do not use this controller with cache modules designed for other controller models, because the controller can malfunction and you can lose data. Also, do not transfer this cache module to an unsupported controller model, because you can lose data.

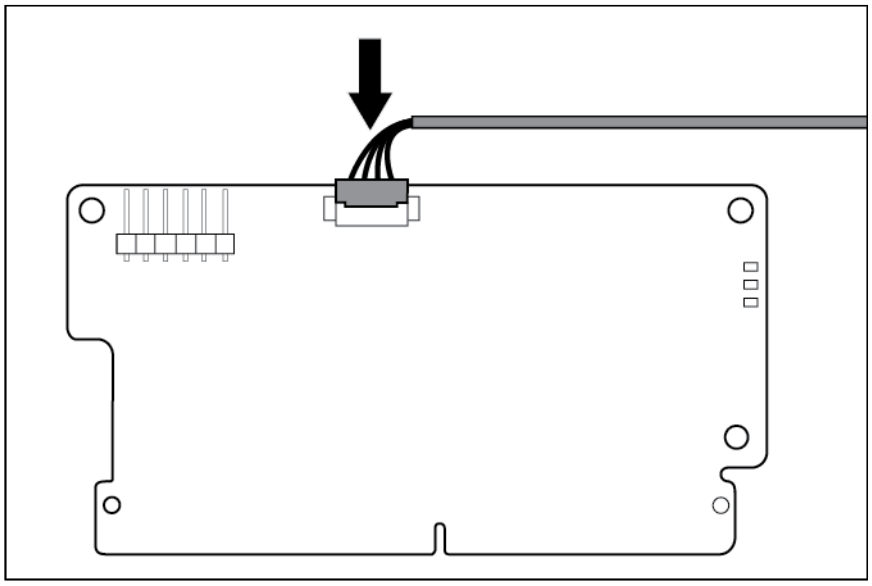
To install the component:

1. Back up all data.
2. Close all applications.

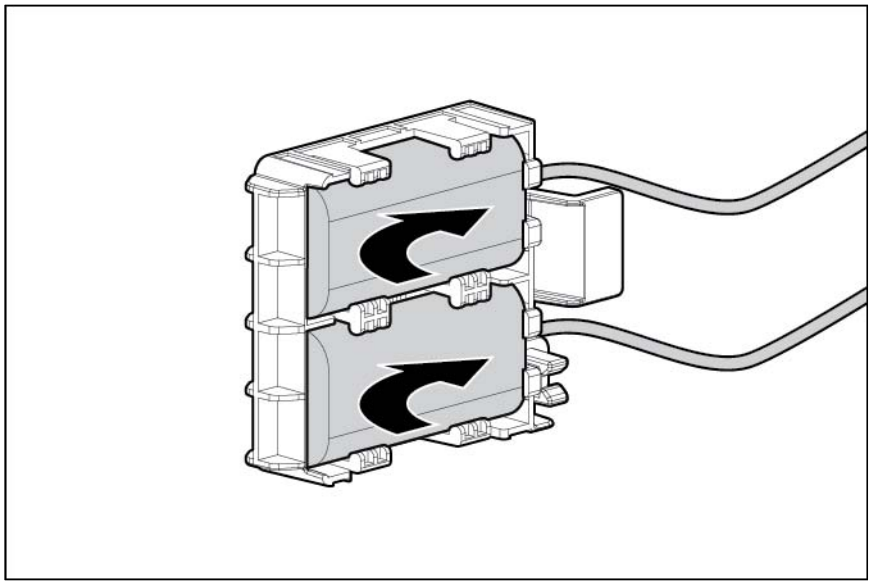
△ **CAUTION:** In systems that use external data storage, be sure that the server is the first unit to be powered down and the last to be powered back up. Taking this precaution ensures that the system does not erroneously mark the drives as failed when the server is powered up.

3. Power down the server (on page 21).
4. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
5. Extend the server from the rack (on page 21).
6. Remove the access panel (on page 22).
7. Install the FBWC module ("Installing the flash-backed write cache module" on page 55), if it is not already installed.

8. Connect the capacitor pack cable to the connector on the top of the cache module.

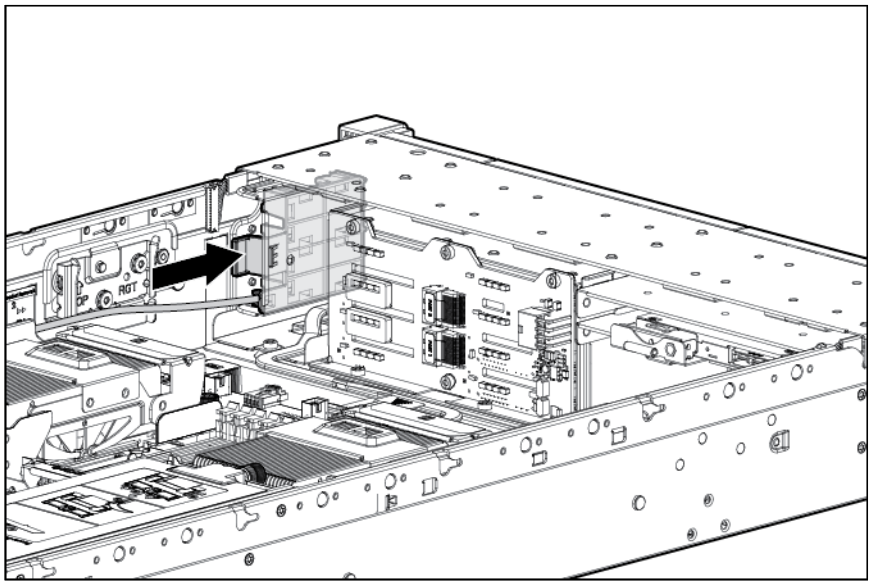


9. Install one or two FBWC capacitor packs into the FBWC capacitor pack holder.

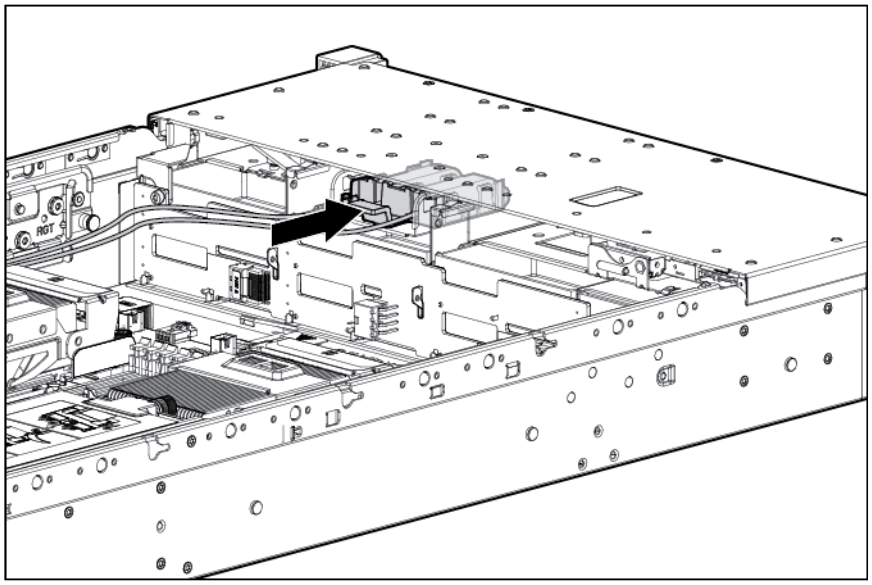


10. Install the FBWC capacitor pack holder into the server:

- 8 or 16 drive SFF



- 8 drive LFF



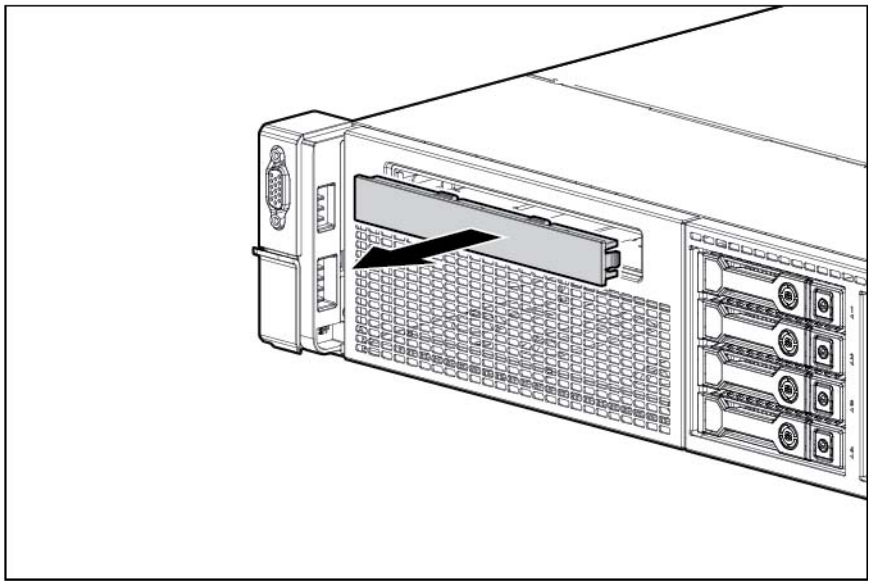
11. Install the access panel (on page 23).
12. Install the server into the rack ("Installing the server into the rack" on page 35).
13. Connect each power cord to the server.
14. Connect each power cord to the power source.
15. Power up the server (on page 21).

Optical drive option

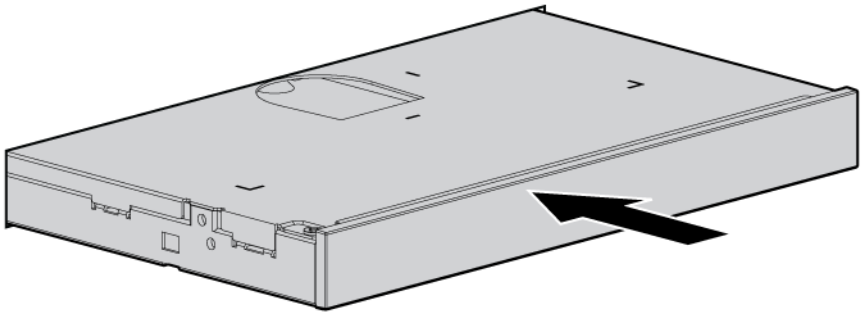
1. Power down the server (on page 21).
2. Remove all power:
   a. Disconnect each power cord from the power source.

b. Disconnect each power cord from the server.

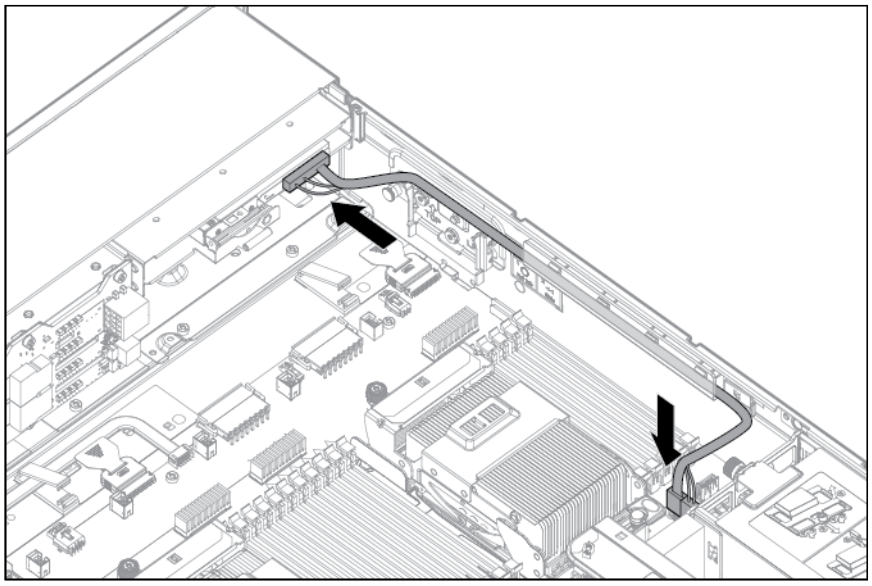
3. Extend the server from the rack (on page 21).
4. Remove the access panel (on page 22).
5. Remove the existing media drive option or blank.



6. Slide the optical drive into the drive bay.



7. Connect the power and data cable to the system board and the optical drive.



8. Install the access panel (on page 23).
9. Install the server into the rack ("Installing the server into the rack" on page 35).
10. Connect each power cord to the server.
11. Connect each power cord to the power source.
12. Power up the server (on page 21).

Redundant hot-plug power supply option

CAUTION: All power supplies installed in the server must have the same output power capacity. Verify that all power supplies have the same part number and label color. The system becomes unstable and may shut down when it detects mismatched power supplies.

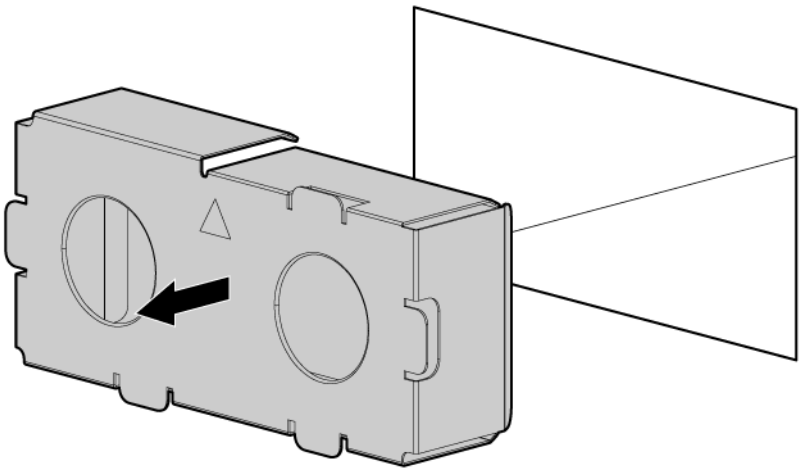
Label color	Output
Blue	460W
Orange	750W
White	750W 48V DC
Green	1,200W

CAUTION: To prevent improper cooling and thermal damage, do not operate the server unless all bays are populated with either a component or a blank.

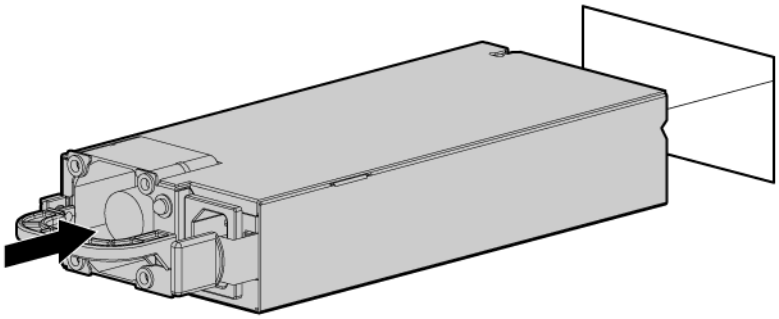
To install the component:

1. Access the product rear panel (on page 23).
2. Remove the blank.

WARNING: To reduce the risk of personal injury from hot surfaces, allow the power supply or power supply blank to cool before touching it.



3. Insert the power supply into the power supply bay until it clicks into place.



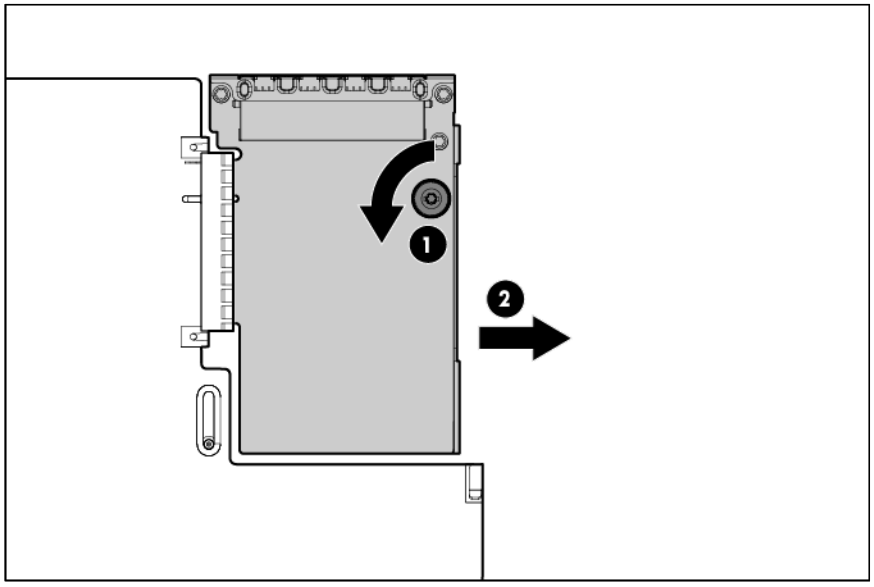
4. Connect the power cord to the power supply.
5. Route the power cord. Use best practices when routing power cords and other cables. A cable management arm is available to help with routing. To obtain a cable management arm, contact an HP authorized reseller.
6. Connect the power cord to the AC power source.
7. Be sure that the power supply LED is green ("Rear panel LEDs and buttons" on page 12).

FlexLOM option

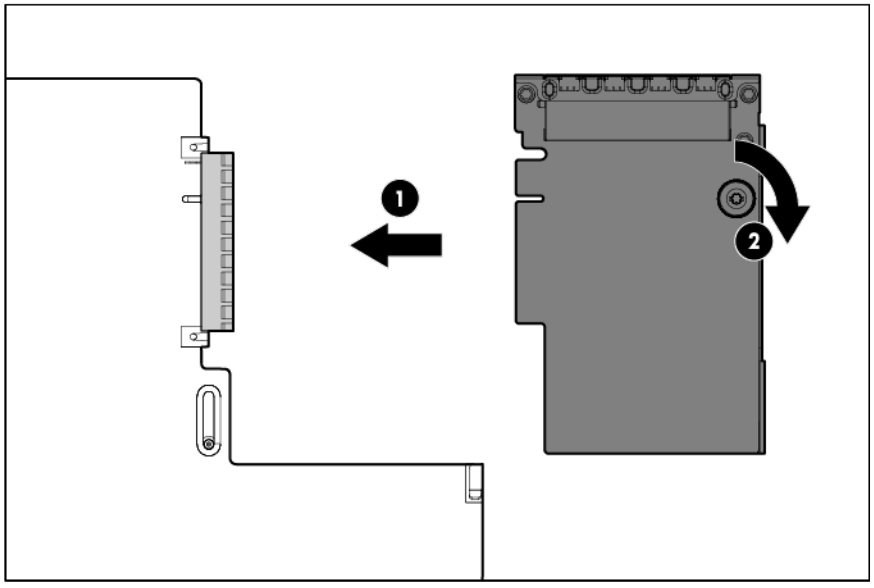
⚠ **WARNING:** To reduce the risk of personal injury, electric shock, or damage to the equipment, remove the power cord to remove power from the server. The front panel Power On/Standby button does not completely shut off system power. Portions of the power supply and some internal circuitry remain active until AC power is removed.

1. Power down the server (on page 21).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.

3. Remove any attached network cables.
4. Extend the server from the rack (on page 21).
5. Remove the access panel (on page 22).
6. Loosen the thumbscrew.
7. Remove the existing FlexLOM.



8. Install the component:
   a. Firmly seat the FlexLOM in the slot.
   b. Tighten the thumbscrew.



9. Install the access panel (on page 23).
10. Slide the server into the rack.
11. Connect the LAN segment cables.
12. Connect each power cord to the server.

13. Connect each power cord to the power source.
14. Power up the server (on page 21).

Expansion board options

The server supports PCI Express expansion boards. The server ships with PCIe riser boards and expansion slots. PCIe expansion boards are supported with optional riser boards.

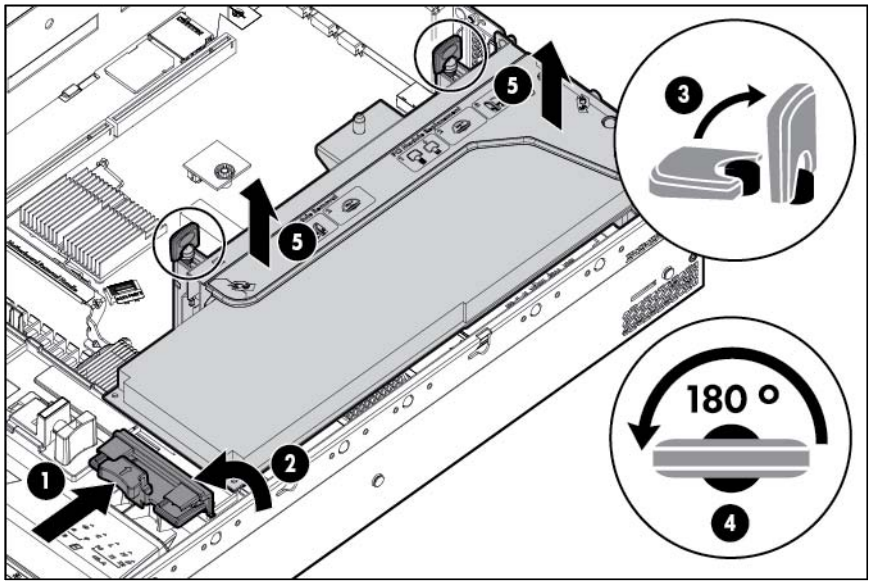
Removing the expansion slot blanks

CAUTION: To prevent damage to the server or expansion boards, power down the server and remove all AC power cords before removing or installing the PCI riser cage.

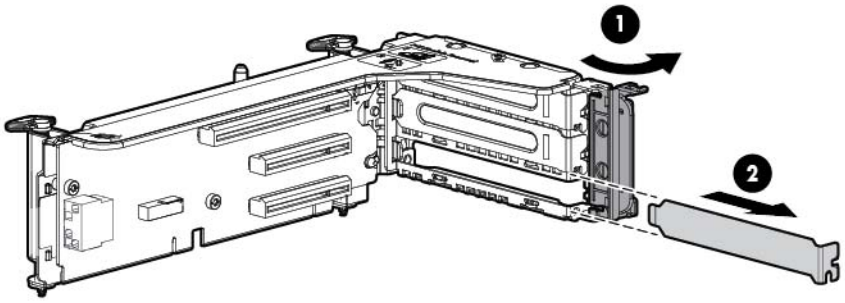
CAUTION: For proper cooling do not operate the server without the access panel, baffles, expansion slot covers, or blanks installed. If the server supports hot-plug components, minimize the amount of time the access panel is open.

To remove the component:

1. Power down the server (on page 21).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Extend the server from the rack (on page 21).
4. Remove the access panel (on page 22).
5. Release the full-length expansion board retainer, and then remove the PCI riser cage.



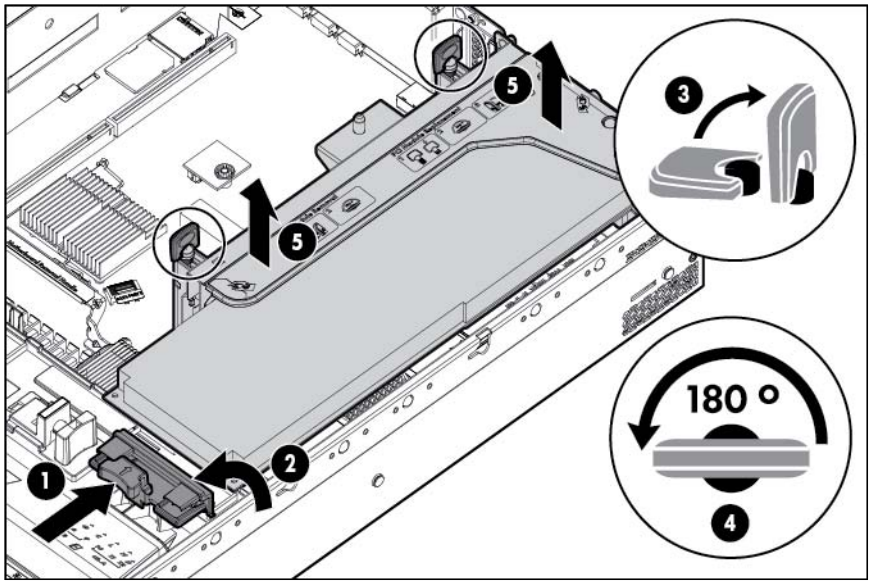
6. Remove the expansion slot blank.



To replace the component, reverse the removal procedure.

Installing a full-length expansion board

1. Power down the server (on page 21).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Extend the server from the rack (on page 21).
4. Remove the access panel (on page 22).
5. Release the full-length expansion board retainer, and then remove the PCI riser cage.

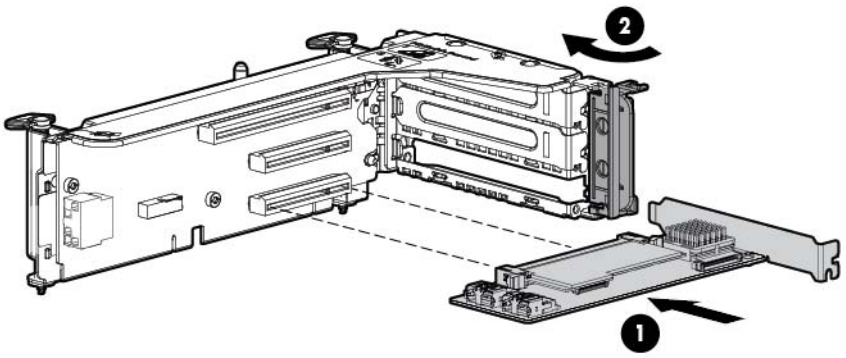


6. Remove the expansion slot cover ("Removing the expansion slot blanks" on page 63).
7. Install the expansion board.

8. Connect any required internal or external cables to the expansion board. See the documentation that ships with the expansion board.
9. Install the PCI riser cage (on page 27).
10. Secure the full-length expansion board retainer (on page 28) if any full-length expansion boards are installed.
11. Install the access panel (on page 23).
12. Install the server into the rack ("Installing the server into the rack" on page 35).
13. Connect each power cord to the server.
14. Connect each power cord to the power source.
15. Power up the server (on page 21).

Installing a half-length expansion board

1. Power down the server (on page 21).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Extend the server from the rack (on page 21).
4. Remove the access panel (on page 22).
5. Remove the PCI riser cage.
6. Remove the expansion slot blank ("Removing the expansion slot blanks" on page 63).
7. Install the expansion board.



8. Connect any required internal or external cables to the expansion board. See the documentation that ships with the expansion board.
9. Install the PCI riser cage (on page 27).
10. Install the access panel (on page 23).
11. Install the server into the rack ("Installing the server into the rack" on page 35).
12. Connect each power cord to the server.

13. Connect each power cord to the power source.
14. Power up the server (on page 21).

Secondary PCI riser cage option

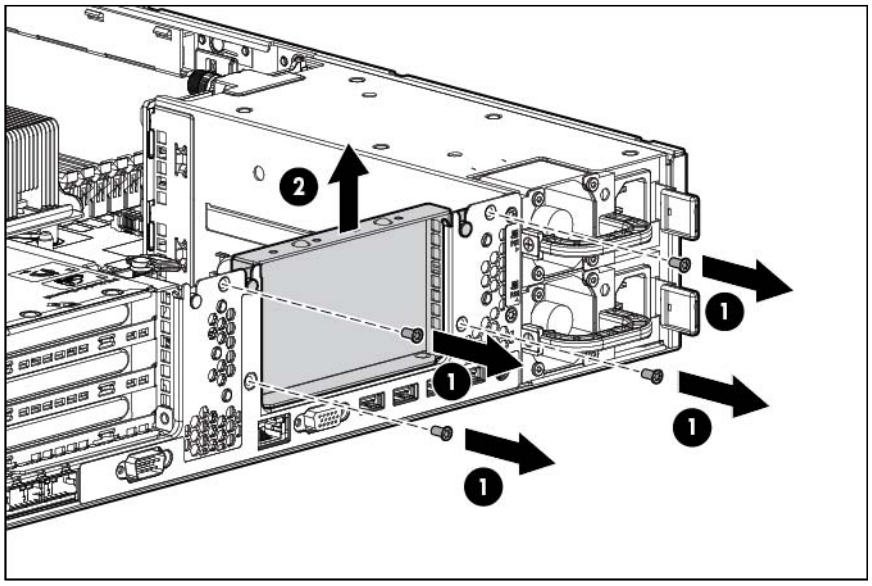
WARNING: To reduce the risk of personal injury, electric shock, or damage to the equipment, remove the power cord to remove power from the server. The front panel Power On/Standby button does not completely shut off system power. Portions of the power supply and some internal circuitry remain active until AC power is removed.

CAUTION: To prevent improper cooling and thermal damage, do not operate the server unless all PCI slots have either an expansion slot cover or an expansion board installed.

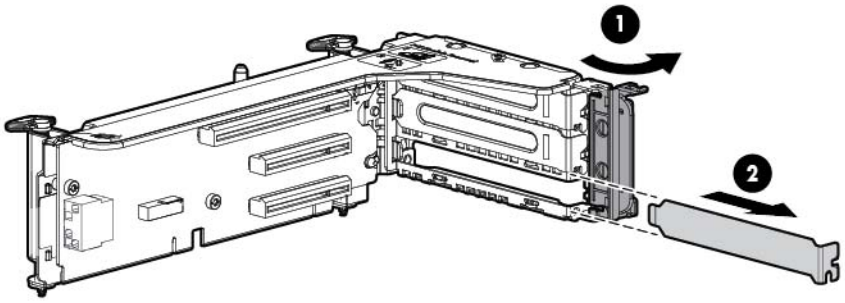
IMPORTANT: The secondary PCI riser cage option requires both processors.

To install the component:

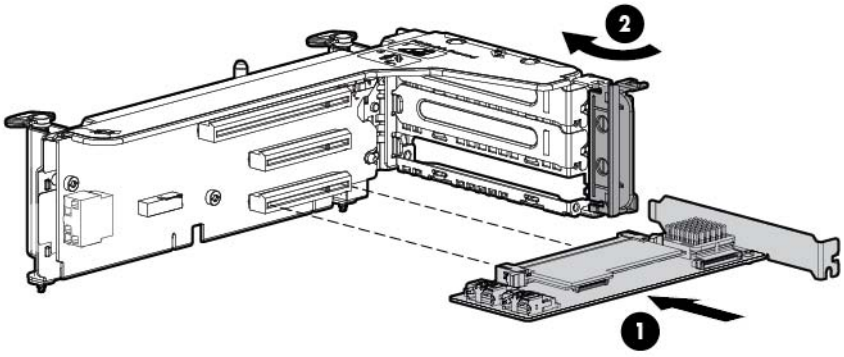
1. Power down the server (on page 21).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Extend the server from the rack (on page 21).
4. Remove the access panel (on page 22).
5. Remove the PCI riser blank.



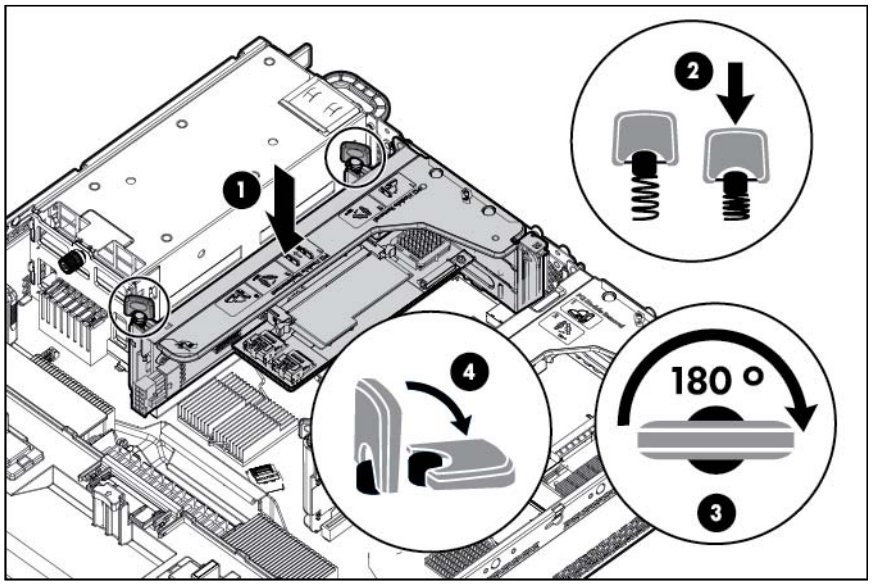
6. Remove the blank from the optional secondary PCI riser cage.



7. Install an expansion board into the PCI riser cage.



8. Install the optional secondary PCI riser cage.



9. If not already installed, install the secondary processor ("Processor and fan option" on page 39).
10. Install the access panel (on page 23).
11. Install the server into the rack ("Installing the server into the rack" on page 35).
12. Connect each power cord to the server.
13. Connect each power cord to the power source.
14. Power up the server (on page 21).

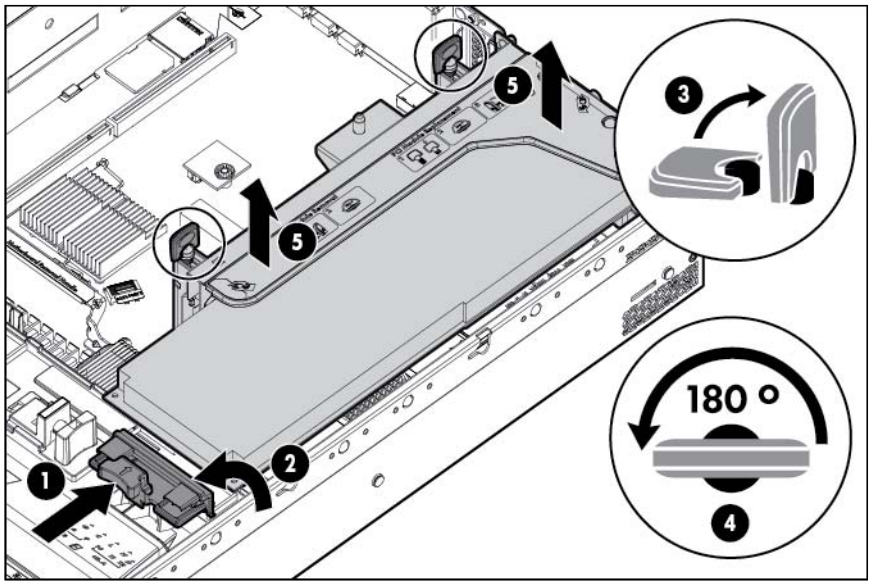
Hard drive cage option

A SAS expander card or an additional SAS controller option is required to support the hard drive cage option.

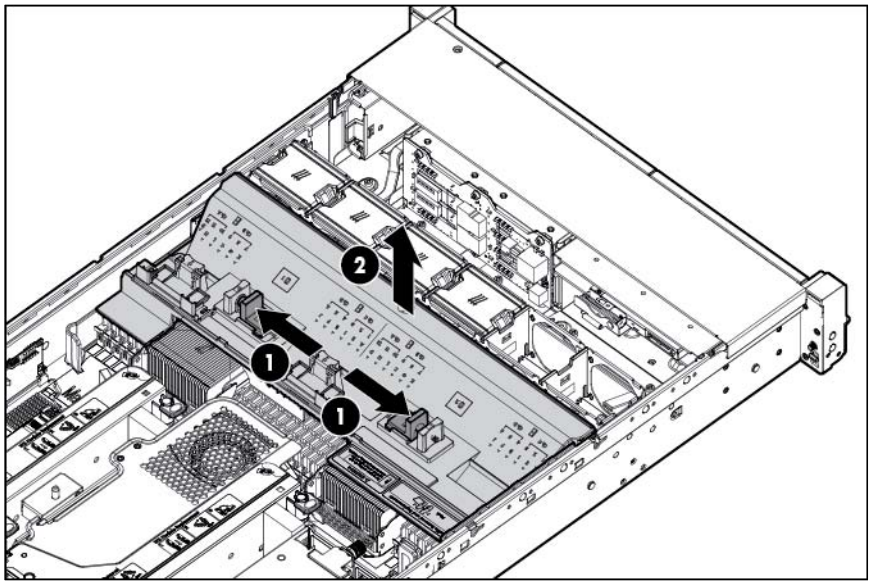
To install the component:

1. Power down the server (on page 21).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Extend the server from the rack (on page 21).
4. Remove the access panel (on page 22).

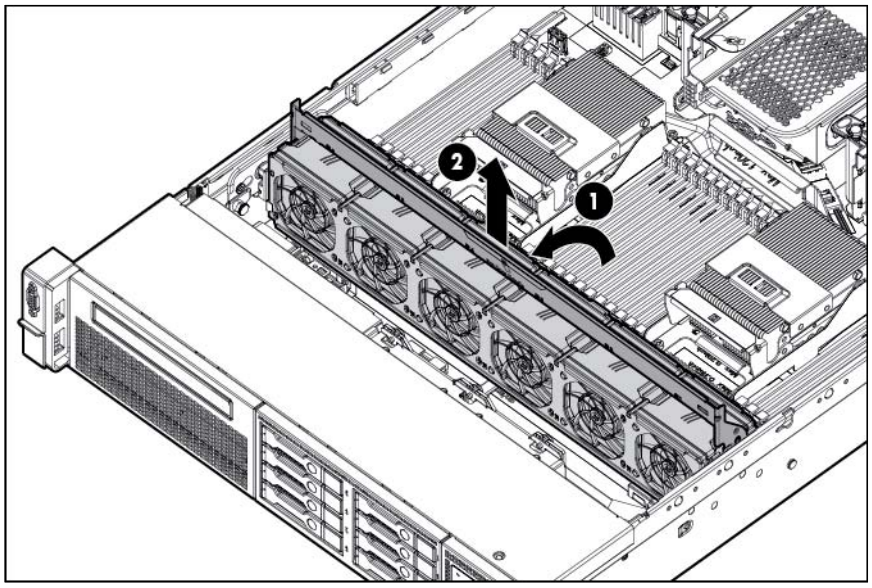
5. Release the full-length expansion board retainer, and then remove the PCI riser cage.



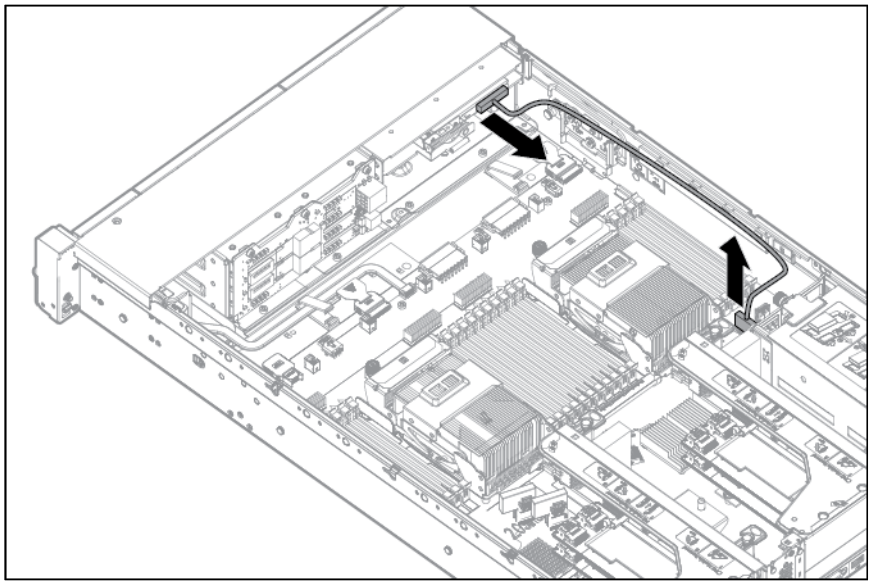
6. Remove the air baffle.



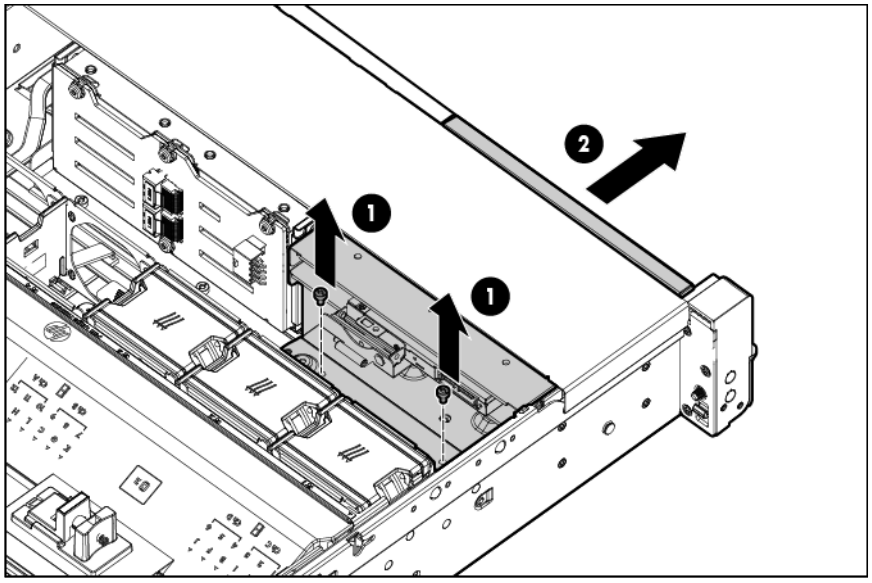
7. Remove the fan cage.



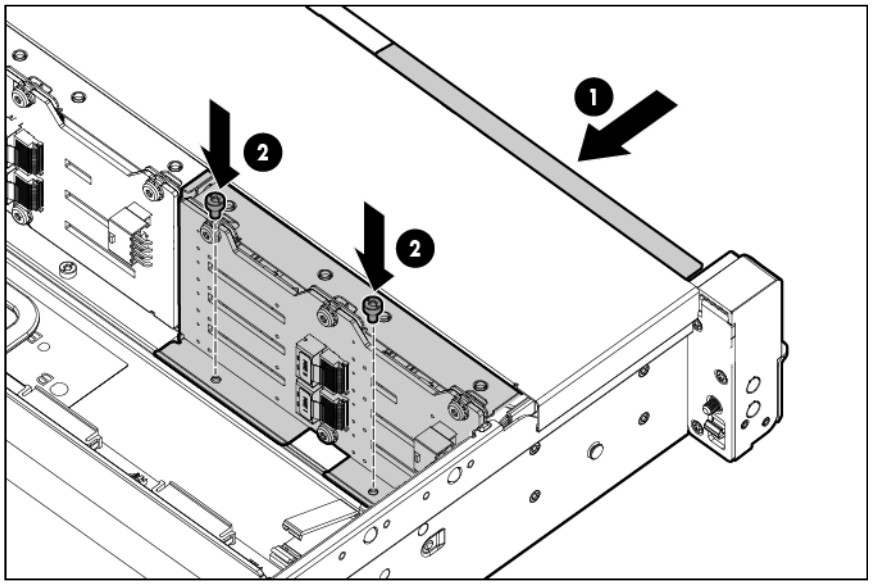
8. Disconnect and remove the optical drive cable, if installed.



9. Using a T-15 Torx screwdriver, remove the two optical drive retaining screws, and then remove the optical drive cage.

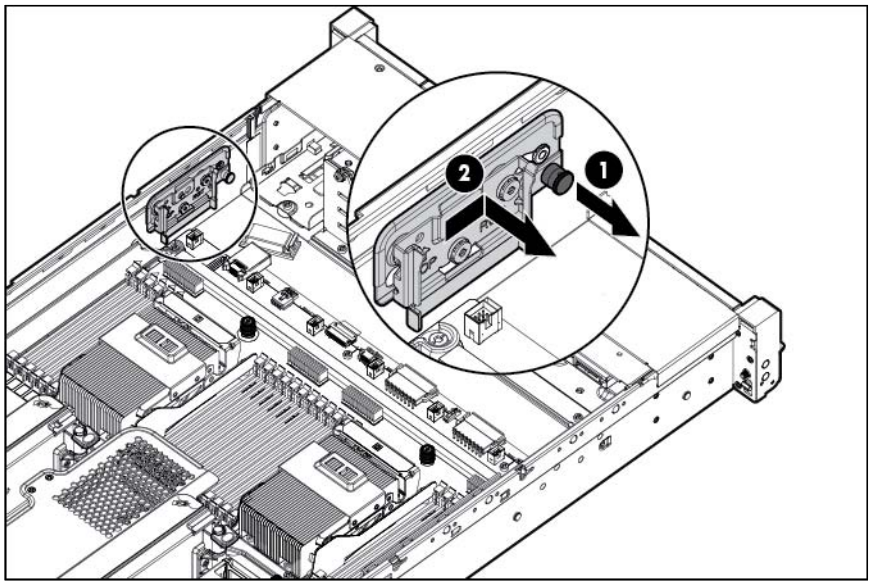


10. Install the optional hard drive cage.

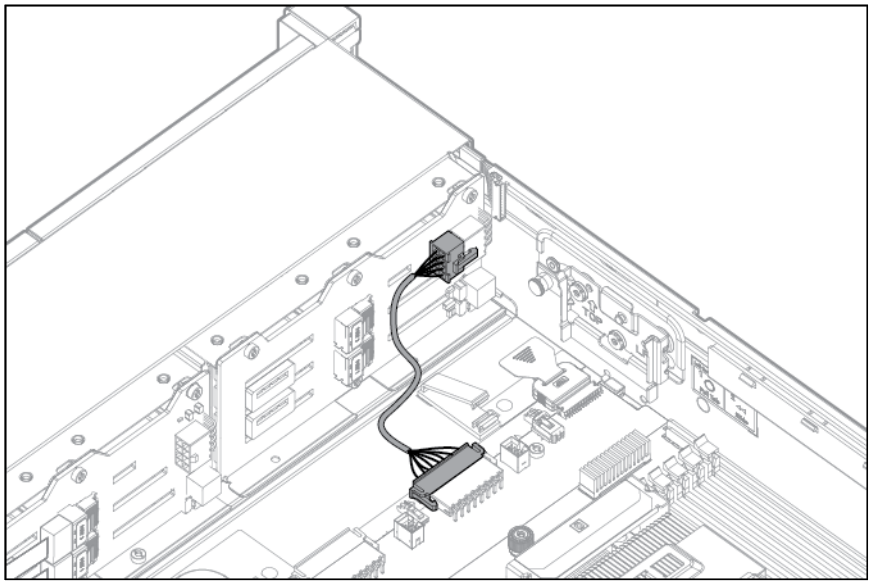


11. Install the hard drives and hard drive blanks.

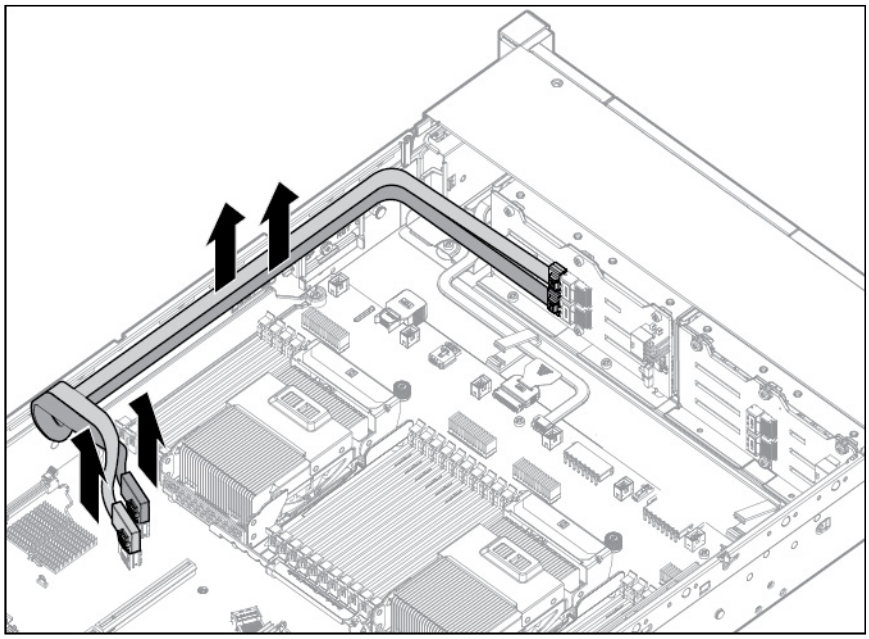
12. To access the cables, remove the fan bracket on the right side of the chassis.



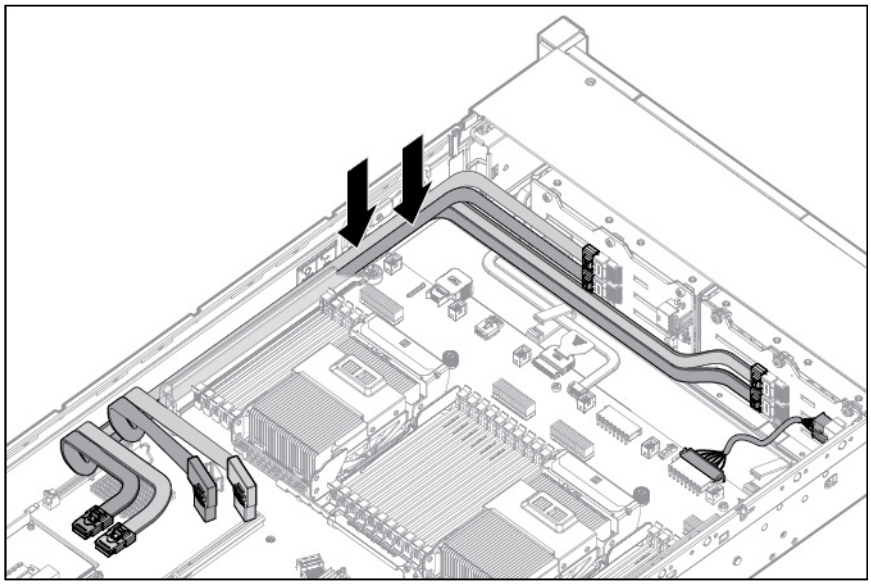
13. Connect the cables:
    a. Connect one end of the power cable to the SAS backplane and the other end to the power connector on the system board.



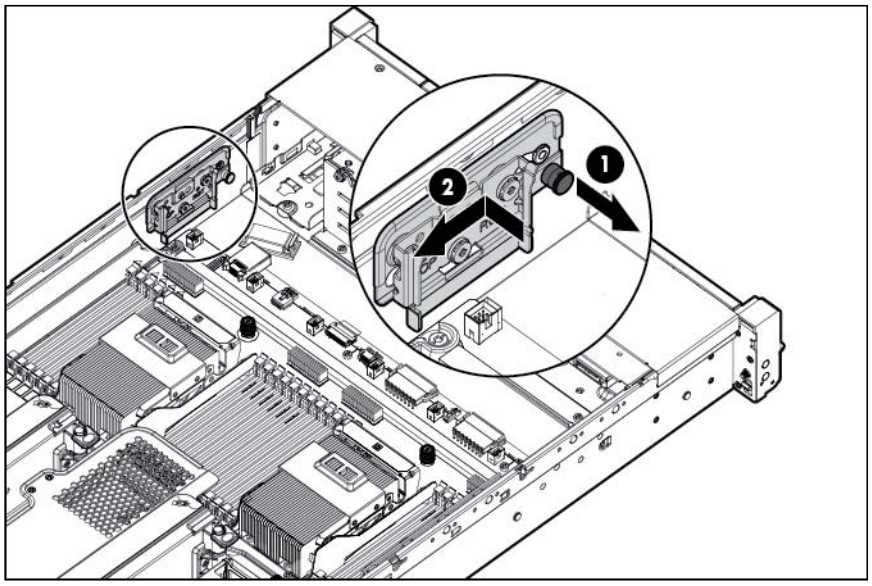
b. Remove the existing SAS cable from the cable guide and from the system board.



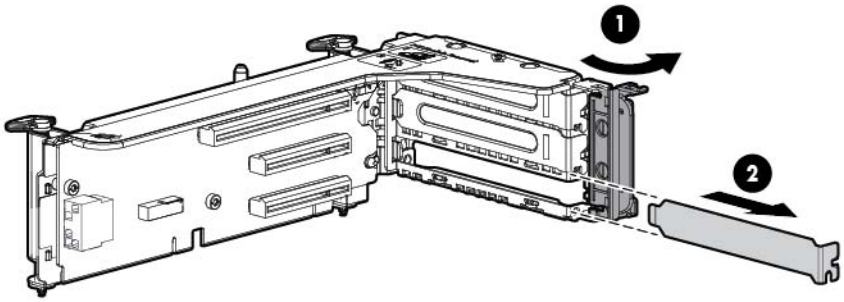
14. Connect the end of each SAS signal cable to the SAS backplane, and then route the SAS signal cables behind the cable guide. Do not connect the other ends yet.



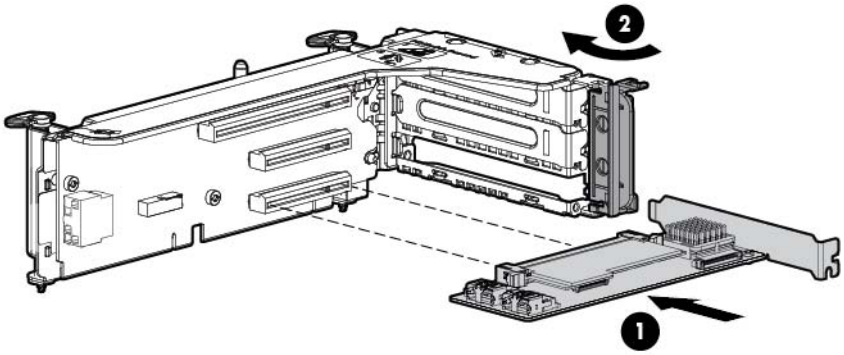
15. Install the fan bracket. Be sure that the cables are properly routed in the channel along the fan bracket.



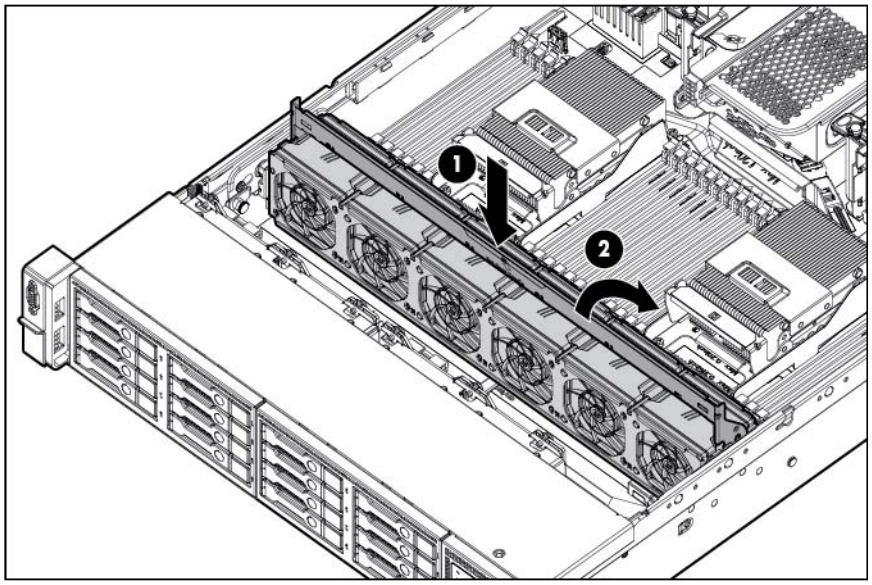
16. Remove the blank from the PCI riser cage.



17. Install the SAS controller board into the PCI riser cage.

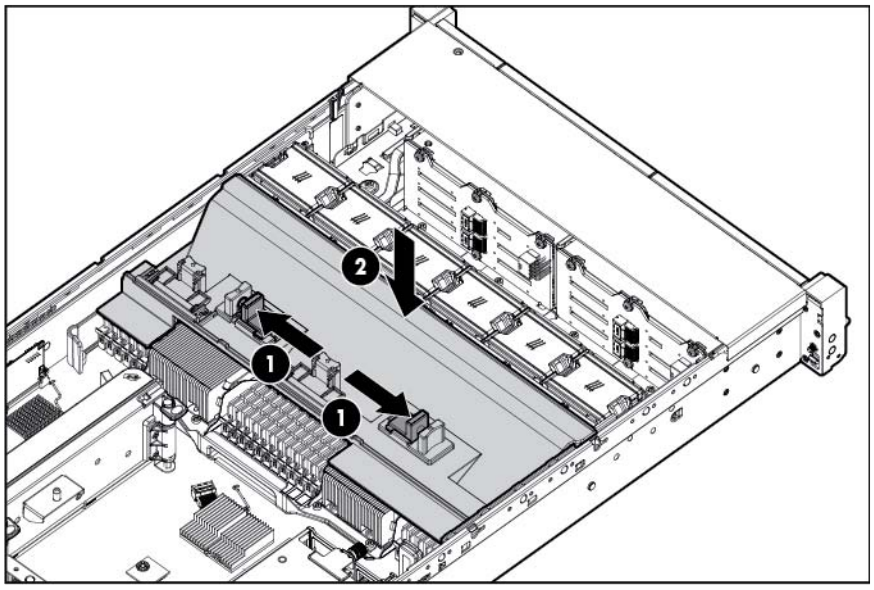


18. Install the fan cage.



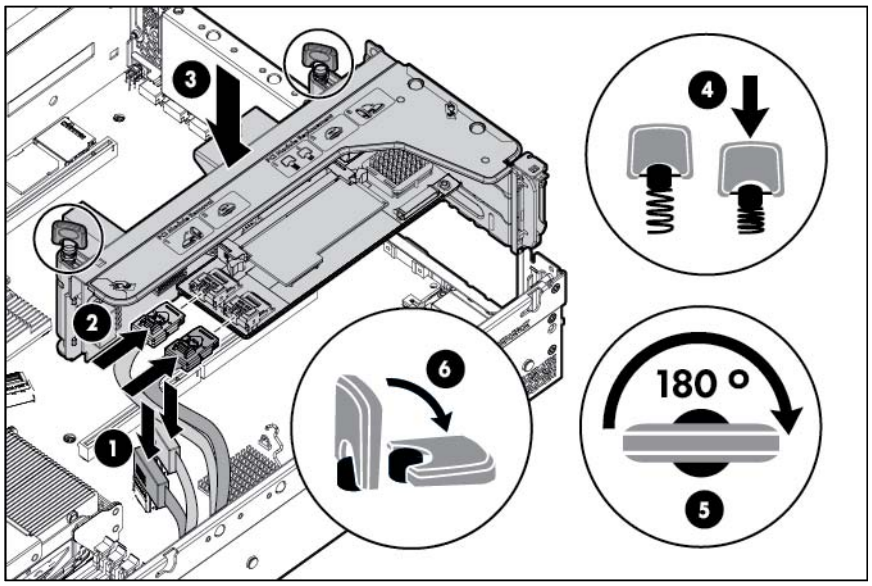
19. Install the air baffle.

If you do not have a full-length expansion board, the air baffle can be installed last.

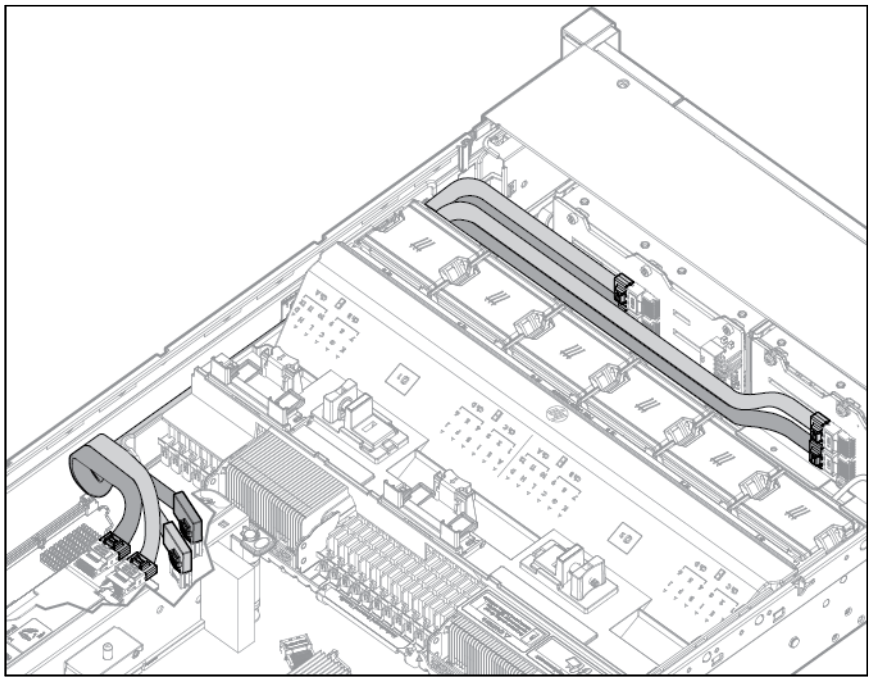


20. Connect the other end of the SAS signal cables to the SAS controller board and to the system board. Then, install the PCI riser cage.

    SAS cables can be connected to the PCI riser cage and the system board before or after the PCI riser cage is installed. For ease of accessing connectors, HP recommends connecting the cables before the PCI riser cage is installed.



Completed SAS cabling:



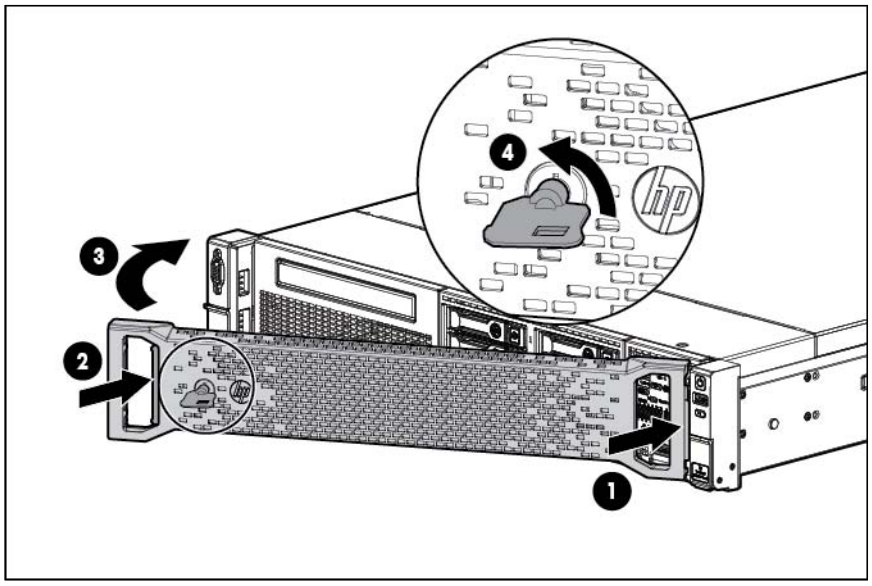
21. Make sure any installed full-length expansion boards are seated in the retainer clip on the air baffle.
22. Install the access panel (on page 23).
23. Install the server into the rack.
24. Connect each power cord to the server.
25. Connect each power cord to the power source.
26. Power up the server (on page 21).

2U rack bezel option

The 2U rack bezel helps prevent any unauthorized physical access to the server in the rack configuration. To access the hard drive cage, you must unlock and open the 2U rack bezel.

To unlock the 2U rack bezel, use the key provided with the kit.

Install the 2U rack bezel into the chassis, and then lock the 2U rack bezel with the key.



HP Trusted Platform Module option

Use these instructions to install and enable a TPM on a supported server. This procedure includes three sections:

1. Installing the Trusted Platform Module board.
2. Retaining the recovery key/password (on page 80).
3. Enabling the Trusted Platform Module (on page 80).

   Enabling the TPM requires accessing RBSU ("HP ROM-Based Setup Utility" on page 94). For more information about RBSU, see the HP website (http://www.hp.com/go/ilomgmtengine/docs).

TPM installation requires the use of drive encryption technology, such as the Microsoft Windows BitLocker Drive Encryption feature. For more information on BitLocker, see the Microsoft website (http://www.microsoft.com).

△ **CAUTION:** Always observe the guidelines in this document. Failure to follow these guidelines can cause hardware damage or halt data access.

When installing or replacing a TPM, observe the following guidelines:

- Do not remove an installed TPM. Once installed, the TPM becomes a permanent part of the system board.
- When installing or replacing hardware, HP service providers cannot enable the TPM or the encryption technology. For security reasons, only the customer can enable these features.
- When returning a system board for service replacement, do not remove the TPM from the system board. When requested, HP Service provides a TPM with the spare system board.
- Any attempt to remove an installed TPM from the system board breaks or disfigures the TPM security rivet. Upon locating a broken or disfigured rivet on an installed TPM, administrators should consider the system compromised and take appropriate measures to ensure the integrity of the system data.
- When using BitLocker, always retain the recovery key/password. The recovery key/password is required to enter Recovery Mode after BitLocker detects a possible compromise of system integrity.

- HP is not liable for blocked data access caused by improper TPM use. For operating instructions, see the encryption technology feature documentation provided by the operating system.

Installing the Trusted Platform Module board

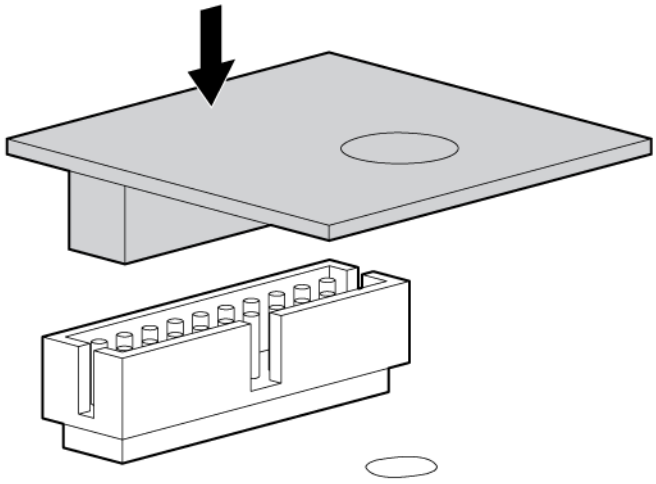
> ⚠ **WARNING:** To reduce the risk of personal injury, electric shock, or damage to the equipment, remove the power cord to remove power from the server. The front panel Power On/Standby button does not completely shut off system power. Portions of the power supply and some internal circuitry remain active until AC power is removed.

> ⚠ **WARNING:** To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

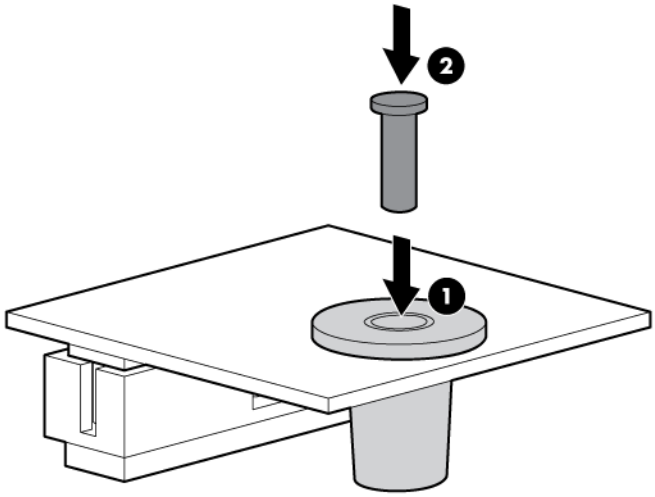
1. Power down the server (on page 21).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Remove the server from the rack, if necessary.
4. Place the server on a flat, level work surface.
5. Remove the access panel (on page 22).
6. Remove the PCI riser cage.
7. Remove the air baffle (on page 29).

> △ **CAUTION:** Any attempt to remove an installed TPM from the system board breaks or disfigures the TPM security rivet. Upon locating a broken or disfigured rivet on an installed TPM, administrators should consider the system compromised and take appropriate measures to ensure the integrity of the system data.

8. Install the TPM board. Press down on the connector to seat the board ("System board components" on page 14).



9. Install the TPM security rivet by pressing the rivet firmly into the system board.



10. Install the air baffle.
11. Install the PCI riser cage (on page 27).
12. Install the access panel (on page 23).
13. Install the server into the rack ("Installing the server into the rack" on page 35).
14. Connect each power cord to the server.
15. Connect each power cord to the power source.
16. Power up the server (on page 21).

Retaining the recovery key/password

The recovery key/password is generated during BitLocker™ setup, and can be saved and printed after BitLocker™ is enabled. When using BitLocker™, always retain the recovery key/password. The recovery key/password is required to enter Recovery Mode after BitLocker™ detects a possible compromise of system integrity.

To help ensure maximum security, observe the following guidelines when retaining the recovery key/password:

- Always store the recovery key/password in multiple locations.
- Always store copies of the recovery key/password away from the server.
- Do not save the recovery key/password on the encrypted hard drive.

Enabling the Trusted Platform Module

1. When prompted during the start-up sequence, access RBSU by pressing the **F9** key.
2. From the Main Menu, select **Server Security**.
3. From the Server Security Menu, select **Trusted Platform Module**.
4. From the Trusted Platform Module Menu, select **TPM Functionality**.
5. Select **Enable**, and then press the **Enter** key to modify the TPM Functionality setting.

6. Press the **Esc** key to exit the current menu, or press the **F10** key to exit RBSU.
7. Reboot the server.
8. Enable the TPM in the OS. For OS-specific instructions, see the OS documentation.

> **CAUTION:** When a TPM is installed and enabled on the server, data access is locked if you fail to follow the proper procedures for updating the system or option firmware, replacing the system board, replacing a hard drive, or modifying OS application TPM settings.

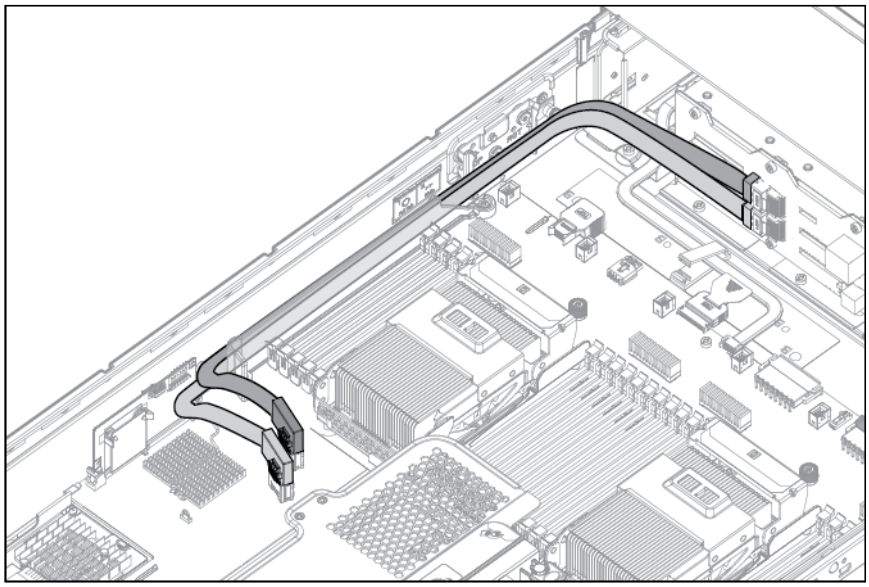
For more information on firmware updates and hardware procedures, see the *HP Trusted Platform Module Best Practices White Paper* on the HP website (http://www.hp.com/support).

For more information on adjusting TPM usage in BitLocker™, see the Microsoft website (http://technet.microsoft.com/en-us/library/cc732774.aspx).

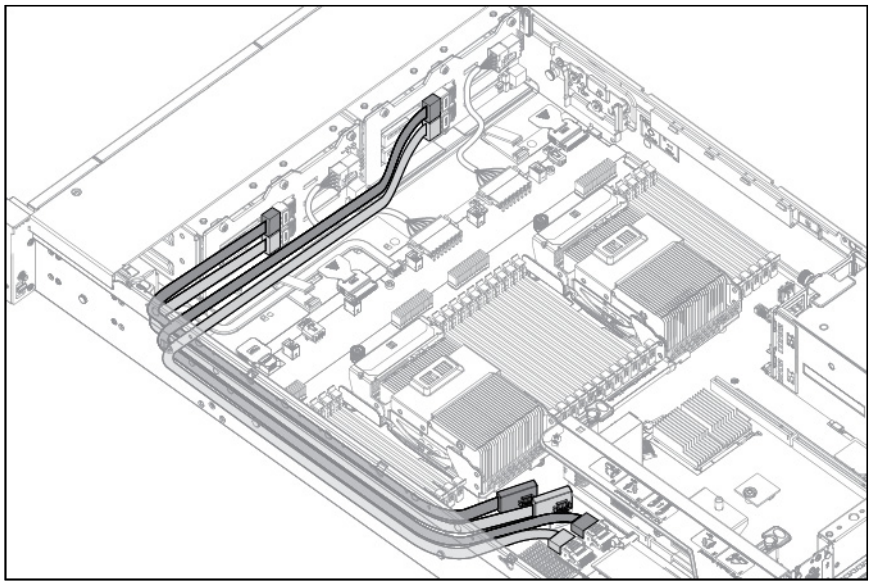
Cabling

SAS hard drive cabling

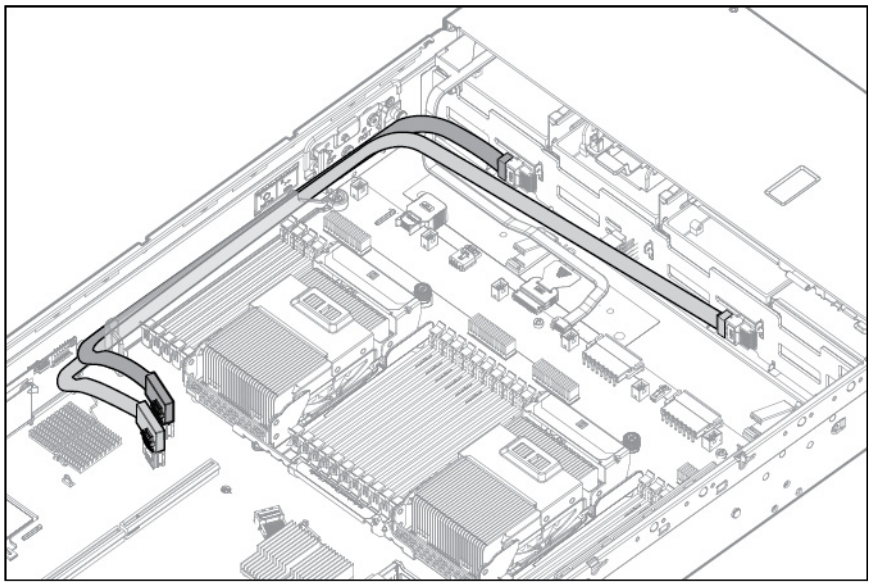
- SFF hard drive cabling:



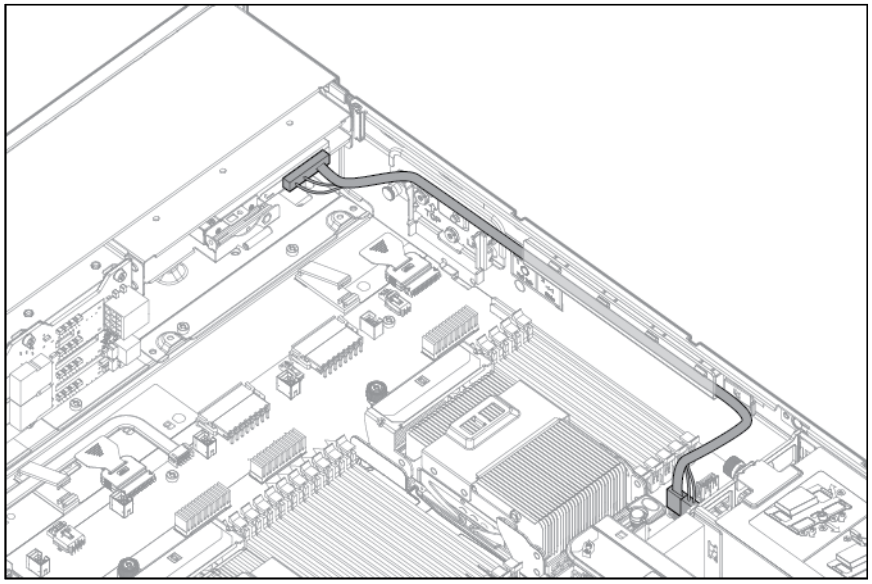
- SFF cabling, with optional drive cage:



- LFF hard drive cabling:

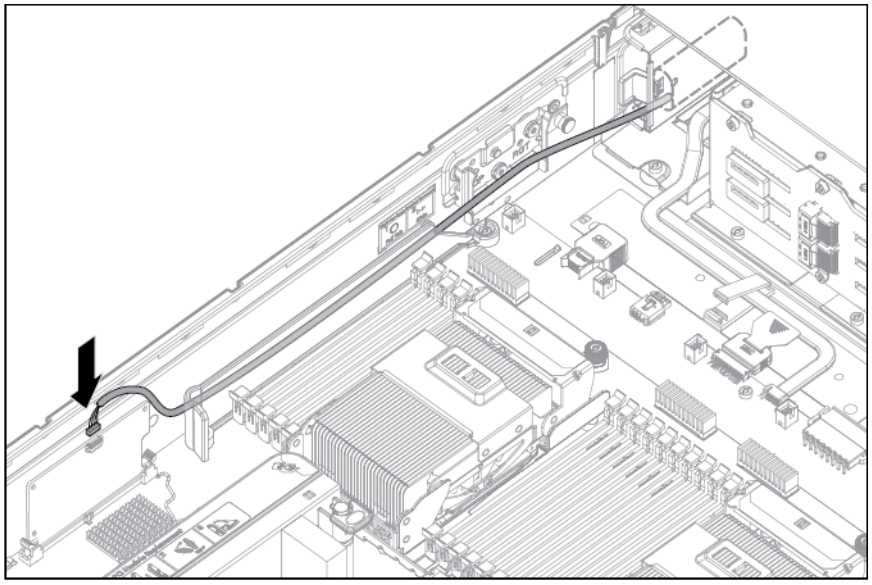


Optical drive cabling

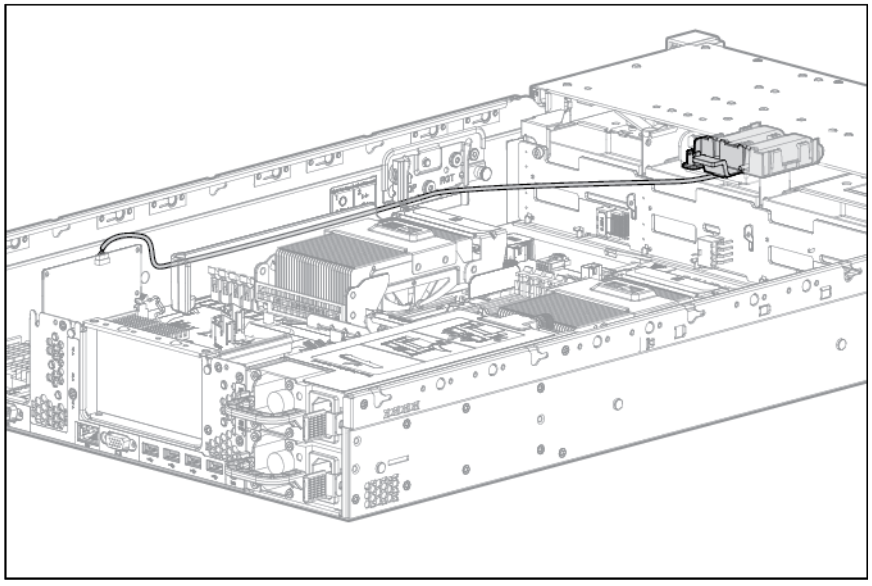


FBWC cabling

- 8 or 16 drive SFF

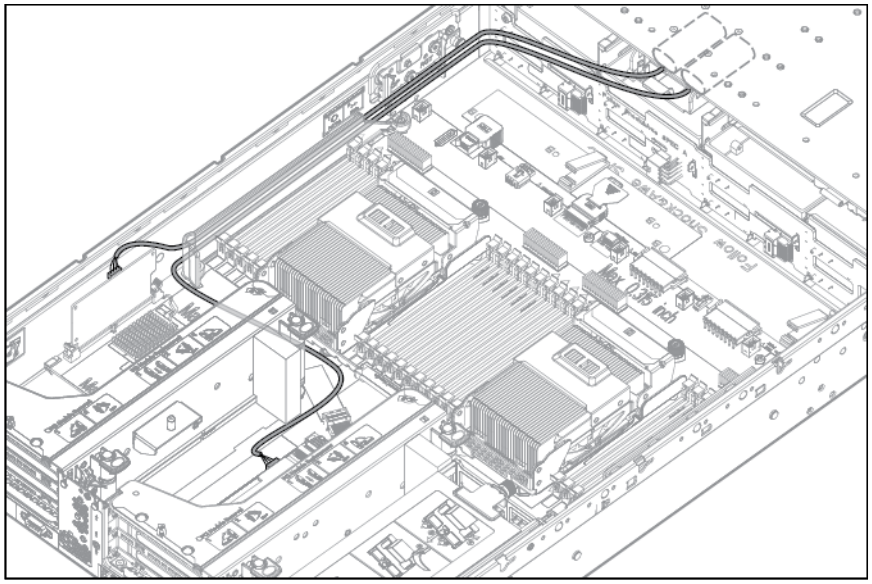


- 8 drive LFF



- PCIe option

Depending on the server configuration, you may need to remove the primary PCI riser cage before cabling to a PCIe expansion board.



Chipset SATA cable option

With the chipset SATA cable option, the chipset SATA controller can be used with a single SATA hard drive that is installed in one hard drive bay of the SFF or LFF hard drive cage.

- When using the chipset SATA configuration, the following conditions apply:
  - Only drive bay 5 is enabled. The remaining drive bays are disabled.
  - The optical bay is disabled because the chipset SATA controller port on the system board is redirected from the optical bay to the drive cage.
  - Hard drive status LEDs are not supported.
  - Hard drive thermal status monitoring is not supported.
  - Hot-plug operation is not supported.
- Because only one drive bay is enabled, all remaining drives can be removed.

  For proper thermal cooling, install blanks in all bays that do not have a drive installed. Order a sufficient number of 6.35-cm (2.5-in) or 8.89-cm (3.5-in) hard drive blank option kits from an HP authorized reseller. For more information, see the server maintenance and service guide.
- The standard SATA driver is included with supported operating systems. No additional driver is required.

To install the component:

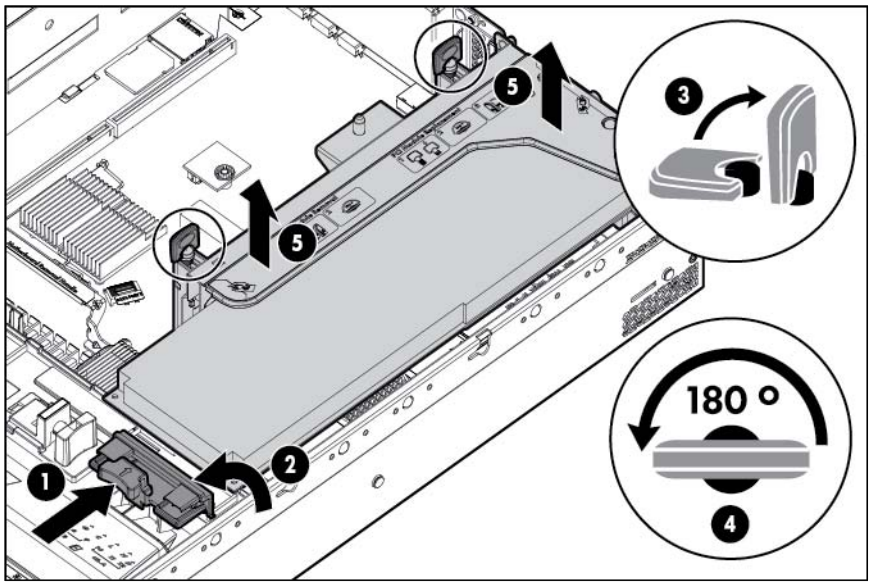
1. Power down the server (on page 21).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Extend the server from the rack (on page 21).
4. Remove the access panel (on page 22).

WARNING: Eliminate the risk of electric shock by removing all AC power from the system before installing or replacing any non-hot-plug hardware option. Disconnect all power cords to completely remove power from the server.

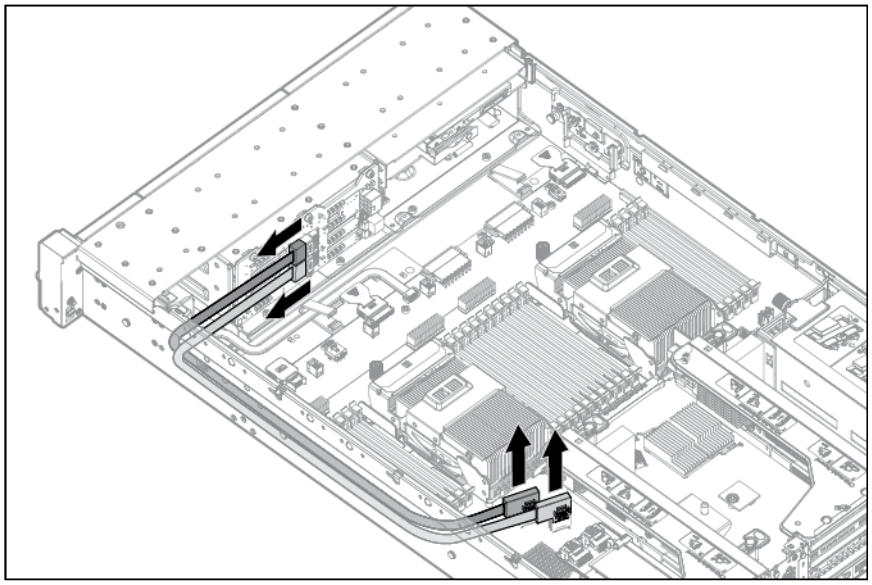
WARNING: To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

IMPORTANT: It is necessary to remove the PCI riser cage only if there is a full-length expansion board installed.

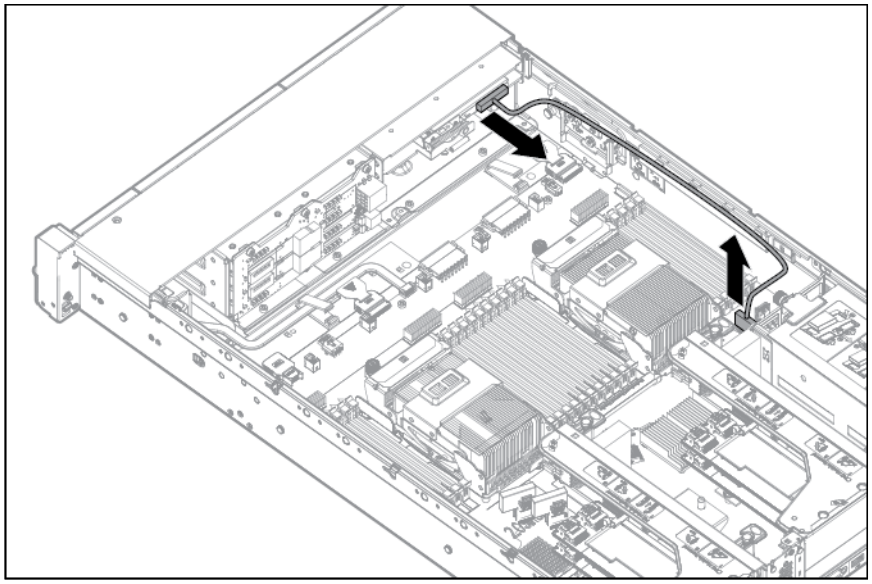
5. Release the full-length expansion board retainer, and then remove the PCI riser cage.



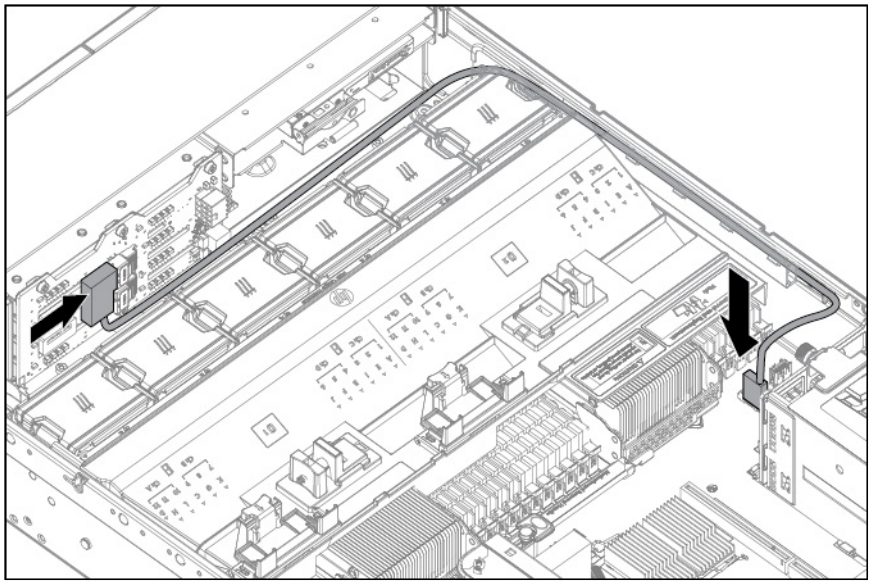
6. Remove the air baffle (on page 29).
7. Remove the fan cage ("Remove the hot-plug fan cage" on page 24).
8. Disconnect any SAS cables from the hard drive cage and either the embedded SAS controller or an optional SAS controller. Do not disconnect the power cable.



9. Disconnect the SATA cable from the optical drive and the SATA connector on the system board. The optical bay is disabled with the chipset SATA cable option.



10. Connect the chipset SATA cable:
    a. Connect the chipset SATA cable connector to the chipset SATA controller port on the system board. The chipset SATA connector on the SATA cable is narrower than the chipset SATA controller port header on the system board.
    b. Connect the remaining chipset SATA cable connector to the SATA header on the hard drive cage.



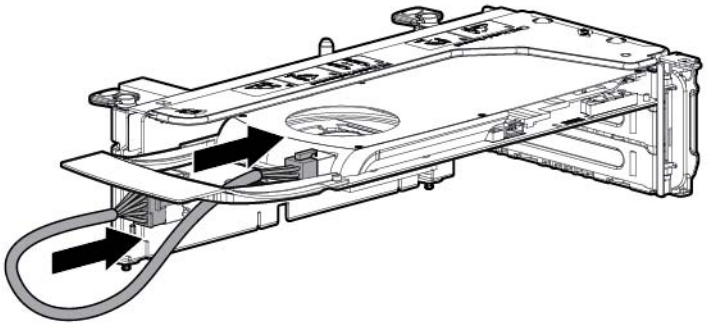
11. Coil the cables behind the hard drive backplane to minimize airflow impact.
12. Install the fan cage ("Remove the hot-plug fan cage" on page 24).
13. Install the air baffle ("Remove the air baffle" on page 29).
14. Install the PCI riser cage (on page 27), if removed.
15. Secure any full-length PCI expansion boards with the retaining latch on the air baffle ("Secure the full-length expansion board retainer" on page 28).
16. Install the access panel (on page 23).

17. Install the server in the rack ("Installing the server into the rack" on page 35).
18. Remove any installed hard drives ("Removing a hot-plug SAS or SATA hard drive" on page 53).
19. Install a SATA hard drive ("Installing a hot-plug SAS or SATA hard drive" on page 52) in hard drive bay 5.
20. Install hard drive blanks in any empty hard drive bays.
21. Connect each power cord to the server.
22. Connect each power cord to the power source.
23. Power up the server (on page 21).
24. Using the HP ROM-Based Setup Utility (on page 94), disable the embedded HP Smart Array P420i Controller, if necessary.

150W PCIe power cable option

CAUTION: To prevent damage to the server or expansion boards, power down the server and remove all AC power cords before removing or installing the PCI expansion cage.

Connect the cable as indicated:



Software and configuration utilities

Server mode

The software and configuration utilities presented in this section operate in online mode, offline mode, or in both modes.

Software or configuration utility	Server mode
HP iLO (on page 89)	Online and Offline
Active Health System (on page 90)	Online and Offline
Integrated Management Log (on page 91)	Online and Offline
Intelligent Provisioning (on page 91)	Offline
HP Insight Diagnostics (on page 92)	Online and Offline
Erase Utility (on page 92)	Offline
Scripting Toolkit (on page 93)	Online
HP Service Pack for ProLiant (on page 93)	Online and Offline
HP Smart Update Manager (on page 93)	Online and Offline
HP ROM-Based Setup Utility (on page 94)	Offline
Array Configuration Utility (on page 96)	Online and Offline
Option ROM Configuration for Arrays (on page 97)	Offline
ROMPaq utility (on page 97)	Offline

Server QuickSpecs

For more information about product features, specifications, options, configurations, and compatibility, see the QuickSpecs on the HP website (http://h18000.www1.hp.com/products/quickspecs/ProductBulletin.html). At the website, choose the geographic region, and then locate the product by name or product category.

HP iLO Management Engine

The HP iLO Management Engine is a set of embedded management features supporting the complete lifecycle of the server, from initial deployment through ongoing management.

HP iLO

The HP iLO subsystem is a standard component of selected HP ProLiant servers that simplifies initial server setup, server health monitoring, power and thermal optimization, and remote server administration. The HP iLO subsystem includes an intelligent microprocessor, secure memory, and a dedicated network interface. This design makes HP iLO independent of the host server and its operating system.

HP iLO enables and manages the Active Health System (on page 90) and also features Agentless Management. All key internal subsystems are monitored by HP iLO. SNMP alerts are sent directly by HP iLO regardless of the host operating system or even if no host operating system is installed.

Using HP iLO, you can do the following:

- Access a high-performance and secure Remote Console to the server from anywhere in the world.
- Use the shared HP iLO Remote Console to collaborate with up to six server administrators.
- Remotely mount high-performance Virtual Media devices to the server.
- Securely and remotely control the power state of the managed server.
- Have true Agentless Management with SNMP alerts from HP iLO regardless of the state of the host server.
- Access Active Health System troubleshooting features through the HP iLO interface.

For more information about HP iLO features (which may require an iLO Advanced Pack or iLO Advanced for BladeSystem license), see the HP iLO documentation on the Documentation CD or on the HP website (http://www.hp.com/go/ilo/docs).

Active Health System

HP Active Health System provides the following features:

- Combined diagnostics tools/scanners
- Always on, continuous monitoring for increased stability and shorter downtimes
- Rich configuration history
- Health and service alerts
- Easy export and upload to Service and Support

The HP Active Health System monitors and records changes in the server hardware and system configuration. The Active Health System assists in diagnosing problems and delivering rapid resolution when server failures occur.

The Active Health System collects the following types of data:

- Server model
- Serial number
- Processor model and speed
- Storage capacity and speed
- Memory capacity and speed
- Firmware/BIOS

HP Active Health System does not collect information about Active Health System users' operations, finances, customers, employees, partners, or data center, such as IP addresses, host names, user names, and passwords. HP Active Health System does not parse or change operating system data from third-party error event log activities, such as content created or passed through by the operating system.

The data that is collected is managed according to the HP Data Privacy policy. For more information see the HP website (http://www.hp.com/go/privacy).

The Active Health System log, in conjunction with the system monitoring provided by Agentless Management or SNMP Pass-thru, provides continuous monitoring of hardware and configuration changes, system status, and service alerts for various server components.

The Agentless Management Service is available in the SPP, which is a disk image (.iso) that you can download from the HP website (http://www.hp.com/go/spp/download). The Active Health System log can be downloaded manually from HP iLO or HP Intelligent Provisioning and sent to HP. For more information, see the *HP iLO User Guide* or *HP Intelligent Provisioning User Guide* on the HP website (http://www.hp.com/go/ilo/docs).

Integrated Management Log

The IML records hundreds of events and stores them in an easy-to-view form. The IML timestamps each event with 1-minute granularity.

You can view recorded events in the IML in several ways, including the following:

- From within HP SIM
- From within operating system-specific IML viewers
  - For Windows: IML Viewer
  - For Linux: IML Viewer Application
- From within the HP iLO user interface
- From within HP Insight Diagnostics (on page 92)

Intelligent Provisioning

Several packaging changes have taken place with HP ProLiant Gen8 servers: SmartStart CDs and the Smart Update Firmware DVD will no longer ship with these new servers. Instead, the deployment capability is embedded in the server as part of HP iLO Management Engine's Intelligent Provisioning.

Intelligent Provisioning is an essential single-server deployment tool embedded in HP ProLiant Gen8 servers that simplifies HP ProLiant server setup, providing a reliable and consistent way to deploy HP ProLiant server configurations.

- Intelligent Provisioning assists with the OS installation process by preparing the system for installing "off-the-shelf" versions of leading operating system software and automatically integrating optimized HP ProLiant server support software from SPP. SPP is the installation package for operating system-specific bundles of HP ProLiant optimized drivers, utilities, management agents, and system firmware.
- Intelligent Provisioning provides maintenance-related tasks through Perform Maintenance features.
- Intelligent Provisioning provides installation help for Microsoft Windows, Red Hat and SUSE Linux, and VMware. For specific OS support, see the *HP Intelligent Provisioning Release Notes*.

For more information on Intelligent Provisioning software, see the HP website (http://www.hp.com/go/ilo). For more information about Intelligent Provisioning drivers, firmware, and SPP, see the HP website (http://www.hp.com/go/spp/download).

HP Insight Diagnostics

HP Insight Diagnostics is a proactive server management tool, available in both offline and online versions, that provides diagnostics and troubleshooting capabilities to assist IT administrators who verify server installations, troubleshoot problems, and perform repair validation.

HP Insight Diagnostics Offline Edition performs various in-depth system and component testing while the OS is not running. To run this utility, boot the server using Intelligent Provisioning (on page 91).

HP Insight Diagnostics Online Edition is a web-based application that captures system configuration and other related data needed for effective server management. Available in Microsoft Windows and Linux versions, the utility helps to ensure proper system operation.

For more information or to download the utility, see the HP website (http://www.hp.com/servers/diags). HP Insight Diagnostics Online Edition is also available in the SPP. For more information, see the HP website (http://www.hp.com/go/spp/download).

HP Insight Diagnostics survey functionality

HP Insight Diagnostics (on page 92) provides survey functionality that gathers critical hardware and software information on ProLiant servers.

This functionality supports operating systems that are supported by the server. For operating systems supported by the server, see the HP website (http://www.hp.com/go/supportos).

If a significant change occurs between data-gathering intervals, the survey function marks the previous information and overwrites the survey data files to reflect the latest changes in the configuration.

Survey functionality is installed with every Intelligent Provisioning-assisted HP Insight Diagnostics installation, or it can be installed through the SPP ("HP Service Pack for ProLiant" on page 93).

Erase Utility

CAUTION: Perform a backup before running the System Erase Utility. The utility sets the system to its original factory state, deletes the current hardware configuration information, including array setup and disk partitioning, and erases all connected hard drives completely. Refer to the instructions for using this utility.

The Erase utility enables you to erase system CMOS, NVRAM, and hard drives. Run the Erase Utility if you must erase the system for the following reasons:

- You want to install a new operating system on a server with an existing operating system.
- You encounter an error when completing the steps of a factory-installed operating system installation.

To access the Erase Utility, click the Perform Maintenance icon from the Intelligent Provisioning home screen and then select **Erase**.

Run the Erase utility to:

- **Reset all settings** — erases all drives, NVRAM, and RBSU
- **Reset all disks** — erases all drives
- **Reset RBSU** — erases current RBSU settings

After selecting the appropriate option, click **Erase System**. Click **Exit** to reboot the server after the erase task is completed. Click **Cancel Erase** to exit the utility without erasing.

Scripting Toolkit

The Scripting Toolkit is a server deployment product that enables you to build an unattended automated installation for high-volume server deployments. The Scripting Toolkit is designed to support ProLiant BL, ML, DL, and SL servers. The toolkit includes a modular set of utilities and important documentation that describes how to apply these tools to build an automated server deployment process.

The Scripting Toolkit provides a flexible way to create standard server configuration scripts. These scripts are used to automate many of the manual steps in the server configuration process. This automated server configuration process cuts time from each deployment, making it possible to scale rapid, high-volume server deployments.

For more information, and to download the Scripting Toolkit, see the HP website (http://www.hp.com/go/ProLiantSTK).

HP Service Pack for ProLiant

SPP is a release set that contains a comprehensive collection of firmware and system software components, all tested together as a single solution stack for HP ProLiant servers, their options, BladeSystem enclosures, and limited HP external storage.

SPP has several key features for updating HP ProLiant servers. Using HP SUM as the deployment tool, SPP can be used in an online mode on a Windows or Linux hosted operating system, or in an offline mode where the server is booted to the ISO so that the server can be updated automatically with no user interaction or updated in interactive mode.

For more information or to download SPP, see the HP website (http://www.hp.com/go/spp).

HP Smart Update Manager

The HP SUM provides intelligent and flexible firmware and software deployment. This technology assists in reducing the complexity of provisioning and updating HP ProLiant Servers, options, and Blades within the data center. HP SUM is used to deploy firmware and software in SPP.

HP SUM enables system administrators to upgrade ROM images efficiently across a wide range of servers and options. This tool has the following features:

- Enables GUI and a command-line, scriptable interface
- Provides scriptable, command-line deployment
- Requires no agent for remote installations
- Enables dependency checking, which ensures appropriate install order and dependency checking between components
- Deploys software and firmware on Windows and Linux operating systems
- Performs local or remote (one-to-many) online deployment
- Deploys firmware and software together
- Supports offline and online deployment
- Deploys necessary component updates only
- Downloads the latest components from Web

- Enables direct update of BMC firmware (HP iLO)

For more information about HP SUM and to access the *HP Smart Update Manager User Guide*, see the HP website (http://www.hp.com/go/hpsum/documentation).

HP ROM-Based Setup Utility

RBSU is a configuration utility embedded in ProLiant servers that performs a wide range of configuration activities that can include the following:

- Configuring system devices and installed options
- Enabling and disabling system features
- Displaying system information
- Selecting the primary boot controller
- Configuring memory options
- Language selection

For more information on RBSU, see the *HP ROM-Based Setup Utility User Guide* on the Documentation CD or the HP website (http://www.hp.com/support/rbsu).

Using RBSU

To use RBSU, use the following keys:

- To access RBSU, press the **F9** key during power-up when prompted.
- To navigate the menu system, use the arrow keys.
- To make selections, press the **Enter** key.
- To access Help for a highlighted configuration option, press the **F1** key.

IMPORTANT: RBSU automatically saves settings when you press the **Enter** key. The utility does not prompt you for confirmation of settings before you exit the utility. To change a selected setting, you must select a different setting and press the **Enter** key.

Default configuration settings are applied to the server at one of the following times:

- Upon the first system power-up
- After defaults have been restored

Default configuration settings are sufficient for proper typical server operation, but configuration settings can be modified using RBSU. The system will prompt you for access to RBSU with each power-up.

Auto-configuration process

The auto-configuration process automatically runs when you boot the server for the first time. During the power-up sequence, the system ROM automatically configures the entire system without needing any intervention. During this process, the ORCA utility, in most cases, automatically configures the array to a default setting based on the number of drives connected to the server.

NOTE: If the boot drive is not empty or has been written to in the past, ORCA does not automatically configure the array. You must run ORCA to configure the array settings.

NOTE: The server may not support all the following examples.

Drives installed	Drives used	RAID level
1	1	RAID 0
2	2	RAID 1
3, 4, 5, or 6	3, 4, 5, or 6	RAID 5
More than 6	0	None

To change any ORCA default settings and override the auto-configuration process, press the **F8** key when prompted.

For more information on RBSU, see the *HP ROM-Based Setup Utility User Guide* on the Documentation CD or the HP website (http://www.hp.com/support/rbsu).

Boot options

Near the end of the boot process, the boot options screen is displayed. This screen is visible for several seconds before the system attempts to boot from a supported boot device. During this time, you can do the following:

- Access RBSU by pressing the **F9** key.
- Access Intelligent Provisioning Maintenance Menu by pressing the **F10** key.
- Access the boot menu by pressing the **F11** key.
- Force a PXE Network boot by pressing the **F12** key.

Configuring AMP modes

Not all ProLiant servers support all AMP modes. RBSU provides menu options only for the modes supported by the server. Advanced memory protection within RBSU enables the following advanced memory modes:

- Advanced ECC Mode—Provides memory protection beyond Standard ECC. All single-bit failures and some multi-bit failures can be corrected without resulting in system downtime.
- Online Spare Mode—Provides protection against failing or degraded DIMMs. Certain memory is set aside as spare, and automatic failover to spare memory occurs when the system detects a degraded DIMM. DIMMs that are likely to receive a fatal or uncorrectable memory error are removed from operation automatically, resulting in less system downtime.

For DIMM population requirements, see the server-specific user guide.

Re-entering the server serial number and product ID

After you replace the system board, you must re-enter the server serial number and the product ID.

1. During the server startup sequence, press the **F9** key to access RBSU.
2. Select the **Advanced Options** menu.
3. Select **Service Options**.
4. Select **Serial Number**. The following warnings appear:

```
WARNING! WARNING! WARNING! The serial number is loaded into the system during
the manufacturing process and should NOT be modified. This option should only
be used by qualified service personnel. This value should always match the
serial number sticker located on the chassis.
Warning: The serial number should ONLY be modified by qualified service
personnel. This value should always match the serial number located on the
chassis.
```

5. Press the **Enter** key to clear the warning.
6. Enter the serial number and press the **Enter** key.
7. Select **Product ID**. The following warning appears:

```
Warning: The Product ID should ONLY be modified by qualified service
personnel. This value should always match the Product ID on the chassis.
```

8. Enter the product ID and press the **Enter** key.
9. Press the **Esc** key to close the menu.
10. Press the **Esc** key to exit RBSU.
11. Press the **F10** key to confirm exiting RBSU. The server automatically reboots.

Utilities and features

Array Configuration Utility

ACU is a browser-based utility with the following features:

- Runs as a local application or remote service accessed through the HP System Management Homepage
- Supports online array capacity expansion, logical drive extension, assignment of online spares, and RAID or stripe size migration
- Suggests the optimum configuration for an unconfigured system
- For supported controllers, provides access to licensed features, including:
  - Moving and deleting individual logical volumes
  - Advanced Capacity Expansion (SATA to SAS and SAS to SATA)
  - Offline Split Mirror
  - RAID 6 and RAID 60
  - RAID 1 (ADM) and RAID 10 (ADM)
  - HP Drive Erase
  - Video-On-Demand Advanced Controller Settings
- Provides different operating modes, enabling faster configuration or greater control over the configuration options
- Remains available any time that the server is on
- Displays on-screen tips for individual steps of a configuration procedure
- Provides context-sensitive searchable help content
- Provides diagnostic and SmartSSD Wear Gauge functionality on the Diagnostics tab

ACU is now available as an embedded utility, starting with HP ProLiant Gen8 servers. To access ACU, use one of the following methods:

- If an optional controller is not installed, press **F10** during boot.
- If an optional controller is installed, when the system recognizes the controller during POST, press **F5**.

For optimum performance, the minimum display settings are 1024 × 768 resolution and 16-bit color. Servers running Microsoft® operating systems require one of the following supported browsers:

- Internet Explorer 6.0 or later
- Mozilla Firefox 2.0 or later

For Linux servers, see the README.TXT file for additional browser and support information.

For more information about the controller and its features, see the *HP Smart Array Controllers for HP ProLiant Servers User Guide* on the HP website (http://bizsupport2.austin.hp.com/bc/docs/support/SupportManual/c01608507/c01608507.pdf). To configure arrays, see the *Configuring Arrays on HP Smart Array Controllers Reference Guide* on the HP website (http://bizsupport1.austin.hp.com/bc/docs/support/SupportManual/c00729544/c00729544.pdf).

Option ROM Configuration for Arrays

Before installing an operating system, you can use the ORCA utility to create the first logical drive, assign RAID levels, and establish online spare configurations.

The utility also provides support for the following functions:

- Reconfiguring one or more logical drives
- Viewing the current logical drive configuration
- Deleting a logical drive configuration
- Setting the controller to be the boot controller
- Selecting the boot volume

If you do not use the utility, ORCA will default to the standard configuration.

For more information regarding the default configurations that ORCA uses, see the *HP ROM-Based Setup Utility User Guide* on the Documentation CD or the HP website (http://www.hp.com/support/rbsu).

For more information about the controller and its features, see the *HP Smart Array Controllers for HP ProLiant Servers User Guide* on the HP website (http://bizsupport2.austin.hp.com/bc/docs/support/SupportManual/c01608507/c01608507.pdf). To configure arrays, see the *Configuring Arrays on HP Smart Array Controllers Reference Guide* on the HP website (http://bizsupport1.austin.hp.com/bc/docs/support/SupportManual/c00729544/c00729544.pdf).

ROMPaq utility

The ROMPaq utility enables you to upgrade the system firmware (BIOS). To upgrade the firmware, insert a ROMPaq USB Key into an available USB port and boot the system. In addition to ROMPaq, Online Flash Components for Windows and Linux operating systems are available for updating the system firmware.

The ROMPaq utility checks the system and provides a choice (if more than one exists) of available firmware revisions.

For more information, see the Download drivers and software page for the server. To access the server-specific page, enter the following web address into the browser:

http://www.hp.com/support/*<servername>*

For example:

http://www.hp.com/support/dl360g6

Automatic Server Recovery

ASR is a feature that causes the system to restart when a catastrophic operating system error occurs, such as a blue screen, ABEND (does not apply to HP ProLiant DL980 Servers), or panic. A system fail-safe timer, the ASR timer, starts when the System Management driver, also known as the Health Driver, is loaded. When the operating system is functioning properly, the system periodically resets the timer. However, when the operating system fails, the timer expires and restarts the server.

ASR increases server availability by restarting the server within a specified time after a system hang. At the same time, the HP SIM console notifies you by sending a message to a designated pager number that ASR has restarted the system. You can disable ASR from the System Management Homepage or through RBSU.

USB support

HP provides both standard USB 2.0 support and legacy USB 2.0 support. Standard support is provided by the OS through the appropriate USB device drivers. Before the OS loads, HP provides support for USB devices through legacy USB support, which is enabled by default in the system ROM.

Legacy USB support provides USB functionality in environments where USB support is not available normally. Specifically, HP provides legacy USB functionality for the following:

- POST
- RBSU
- Diagnostics
- DOS
- Operating environments which do not provide native USB support

Redundant ROM support

The server enables you to upgrade or configure the ROM safely with redundant ROM support. The server has a single ROM that acts as two separate ROM images. In the standard implementation, one side of the ROM contains the current ROM program version, while the other side of the ROM contains a backup version.

NOTE: The server ships with the same version programmed on each side of the ROM.

Safety and security benefits

When you flash the system ROM, ROMPaq writes over the backup ROM and saves the current ROM as a backup, enabling you to switch easily to the alternate ROM version if the new ROM becomes corrupted for any reason. This feature protects the existing ROM version, even if you experience a power failure while flashing the ROM.

Keeping the system current

Drivers

IMPORTANT: Always perform a backup before installing or updating device drivers.

The server includes new hardware that may not have driver support on all OS installation media.

If you are installing an Intelligent Provisioning-supported OS, use Intelligent Provisioning (on page 91) and its Configure and Install feature to install the OS and latest supported drivers.

If you do not use Intelligent Provisioning to install an OS, drivers for some of the new hardware are required. These drivers, as well as other option drivers, ROM images, and value-add software can be downloaded as part of an SPP.

If you are installing drivers from SPP, be sure that you are using the latest SPP version that your server supports. To verify that your server is using the latest supported version and for more information about SPP, see the HP website (http://www.hp.com/go/spp/download).

To directly locate the OS drivers for a particular server, enter the following web address into the browser:

http://www.hp.com/support/<*servername*>

In place of <*servername*>, enter the server name.

For example:

http://www.hp.com/support/dl360g6

Software and firmware

Software and firmware should be updated before using the server for the first time, unless any installed software or components require an older version. For system software and firmware updates, download the SPP ("HP Service Pack for ProLiant" on page 93) from the HP website (http://www.hp.com/go/spp).

Version control

The VCRM and VCA are web-enabled Insight Management Agents tools that HP SIM uses to schedule software update tasks to the entire enterprise.

- VCRM manages the repository for SPP. Administrators can view the SPP contents or configure VCRM to automatically update the repository with internet downloads of the latest software and firmware from HP.
- VCA compares installed software versions on the node with updates available in the VCRM managed repository. Administrators configure VCA to point to a repository managed by VCRM.

For more information about version control tools, see the *HP Systems Insight Manager User Guide,* the *HP Version Control Agent User Guide*, and the *HP Version Control Repository User Guide* on the HP website (http://www.hp.com/go/hpsim).

HP Operating Systems and Virtualization Software Support for ProLiant Servers

For information about specific versions of a supported operating system, see the HP website (http://www.hp.com/go/ossupport).

HP Technology Service Portfolio

HP Technology Services offers a targeted set of consultancy, deployment, and service solutions designed to meet the support needs of the most business and IT environments.

Foundation Care services deliver scalable hardware and software support packages for HP ProLiant server and industry-standard software. You can choose the type and level of service that is most suitable for your business needs.

HP Collaborative Support —With a single call, HP addresses initial hardware and software support needs and helps to quickly identify if a problem is related to hardware or software. If the problem is identified as hardware, HP will resolve as per service level commitments. If the reported incident is related to HP or supported 3rd party software product and cannot be resolved by applying known fixes, HP will contact the third-party vendor and create a problem incident on the your behalf.

HP Proactive Care — For customers running business critical environments where down time is not an option, then HP Proactive Care helps to deliver high levels of application availability. Key to these service options is the delivery of proactive service management offers to help you avoid the causes of down time. If a problems arises than HP offers advanced technical response from critical system support specialist for fast problem identification and resolution.

HP Support Center — All service options include HP Support Center delivering information, tools, and experts required to support HP business products.

HP Insight Remote Support — Provides 24x7 secure remote monitoring, diagnosis and problem resolution.

For more information, see the HP website (http://www.hp.com/services/proliant) or the HP website for the HP BladeSystem (http://www.hp.com/services/bladesystem).

Change control and proactive notification

HP offers Change Control and Proactive Notification to notify customers 30 to 60 days in advance of upcoming hardware and software changes on HP commercial products.

For more information, refer to the HP website (http://www.hp.com/go/pcn).

Troubleshooting

Troubleshooting resources

The *HP ProLiant Gen8 Troubleshooting Guide, Volume I: Troubleshooting* provides procedures for resolving common problems and comprehensive courses of action for fault isolation and identification, issue resolution, and software maintenance on ProLiant servers and server blades. To view the guide, select a language:

- English (http://www.hp.com/support/ProLiant_TSG_v1_en)
- French (http://www.hp.com/support/ProLiant_TSG_v1_fr)
- Spanish (http://www.hp.com/support/ProLiant_TSG_v1_sp)
- German (http://www.hp.com/support/ProLiant_TSG_v1_gr)
- Japanese (http://www.hp.com/support/ProLiant_TSG_v1_jp)
- Simplified Chinese (http://www.hp.com/support/ProLiant_TSG_v1_sc)

The *HP ProLiant Gen8 Troubleshooting Guide, Volume II: Error Messages* provides a list of error messages and information to assist with interpreting and resolving error messages on ProLiant servers and server blades. To view the guide, select a language:

- English (http://www.hp.com/support/ProLiant_EMG_v1_en)
- French (http://www.hp.com/support/ProLiant_EMG_v1_fr)
- Spanish (http://www.hp.com/support/ProLiant_EMG_v1_sp)
- German (http://www.hp.com/support/ProLiant_EMG_v1_gr)
- Japanese (http://www.hp.com/support/ProLiant_EMG_v1_jp)
- Simplified Chinese (http://www.hp.com/support/ProLiant_EMG_v1_sc)

Battery replacement

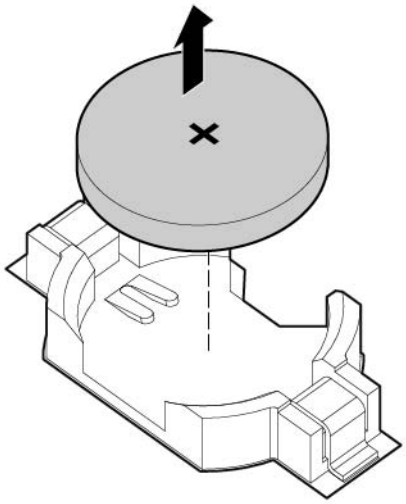
If the server no longer automatically displays the correct date and time, you may need to replace the battery that provides power to the real-time clock.

⚠ **WARNING:** The computer contains an internal lithium manganese dioxide, a vanadium pentoxide, or an alkaline battery pack. A risk of fire and burns exists if the battery pack is not properly handled. To reduce the risk of personal injury:

- Do not attempt to recharge the battery.
- Do not expose the battery to temperatures higher than 60°C (140°F).
- Do not disassemble, crush, puncture, short external contacts, or dispose of in fire or water.
- Replace only with the spare designated for this product.

To remove the component:

1. Power down the server (on page 21).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Extend the server from the rack (on page 21).
4. Remove the access panel (on page 22).
5. Remove the PCI riser cage.
6. Locate the battery ("System board components" on page 14).
7. Remove the battery.



To replace the component, reverse the removal procedure.

For more information about battery replacement or proper disposal, contact an authorized reseller or an authorized service provider.

Regulatory compliance notices

Regulatory compliance identification numbers

For the purpose of regulatory compliance certifications and identification, this product has been assigned a unique regulatory model number. The regulatory model number can be found on the product nameplate label, along with all required approval markings and information. When requesting compliance information for this product, always refer to this regulatory model number. The regulatory model number is not the marketing name or model number of the product.

Federal Communications Commission notice

Part 15 of the Federal Communications Commission (FCC) Rules and Regulations has established Radio Frequency (RF) emission limits to provide an interference-free radio frequency spectrum. Many electronic devices, including computers, generate RF energy incidental to their intended function and are, therefore, covered by these rules. These rules place computers and related peripheral devices into two classes, A and B, depending upon their intended installation. Class A devices are those that may reasonably be expected to be installed in a business or commercial environment. Class B devices are those that may reasonably be expected to be installed in a residential environment (for example, personal computers). The FCC requires devices in both classes to bear a label indicating the interference potential of the device as well as additional operating instructions for the user.

FCC rating label

The FCC rating label on the device shows the classification (A or B) of the equipment. Class B devices have an FCC logo or ID on the label. Class A devices do not have an FCC logo or ID on the label. After you determine the class of the device, refer to the corresponding statement.

FCC Notice, Class A Equipment

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at personal expense.

FCC Notice, Class B Equipment

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to

radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit that is different from that to which the receiver is connected.
- Consult the dealer or an experienced radio or television technician for help.

Declaration of conformity for products marked with the FCC logo, United States only

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

For questions regarding this product, contact us by mail or telephone:

- Hewlett-Packard Company
  P. O. Box 692000, Mail Stop 530113
  Houston, Texas 77269-2000
- 1-800-HP-INVENT (1-800-474-6836). (For continuous quality improvement, calls may be recorded or monitored.)

For questions regarding this FCC declaration, contact us by mail or telephone:

- Hewlett-Packard Company
  P. O. Box 692000, Mail Stop 510101
  Houston, Texas 77269-2000
- 1-281-514-3333

To identify this product, refer to the part, series, or model number found on the product.

Modifications

The FCC requires the user to be notified that any changes or modifications made to this device that are not expressly approved by Hewlett-Packard Company may void the user's authority to operate the equipment.

Cables

Connections to this device must be made with shielded cables with metallic RFI/EMI connector hoods in order to maintain compliance with FCC Rules and Regulations.

Canadian notice (Avis Canadien)

Class A equipment

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Class B equipment

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

European Union regulatory notice

Products bearing the CE marking comply with the following EU Directives:

- Low Voltage Directive 2006/95/EC
- EMC Directive 2004/108/EC
- Ecodesign Directive 2009/125/EC, where applicable

CE compliance of this product is valid if powered with the correct CE-marked AC adapter provided by HP.

Compliance with these directives implies conformity to applicable harmonized European standards (European Norms) that are listed in the EU Declaration of Conformity issued by HP for this product or product family and available (in English only) either within the product documentation or at the following HP website (http://www.hp.eu/certificates) (type the product number in the search field).

The compliance is indicated by one of the following conformity markings placed on the product:

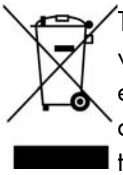
For non-telecommunications products and for EU harmonized telecommunications products, such as Bluetooth® within power class below 10mW.

For EU non-harmonized telecommunications products (If applicable, a 4-digit notified body number is inserted between CE and !).

Please refer to the regulatory label provided on the product.

The point of contact for regulatory matters is Hewlett-Packard GmbH, Dept./MS: HQ-TRE, Herrenberger Strasse 140, 71034 Boeblingen, GERMANY.

Disposal of waste equipment by users in private households in the European Union



This symbol on the product or on its packaging indicates that this product must not be disposed of with your other household waste. Instead, it is your responsibility to dispose of your waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local city office, your household waste disposal service or the shop where you purchased the product.

Japanese notice

ご使用になっている装置に VCCI マークが付いていましたら、次の説明文を
お読み下さい。

この装置は、クラス B 情報技術装置です。この装置は、家庭環境で使用すること
を目的としていますが、この装置がラジオやテレビジョン受信機に近接して
使用されると、受信障害を引き起こすことがあります。取扱説明書に従って
正しい取り扱いをして下さい。

VCCI-B

VCCI マークが付いていない場合には、次の点にご注意下さい。

この装置は、クラス A 情報技術装置です。この装置を家庭環境で使用すると電
波妨害を引き起こすことがあります。この場合には使用者は適切な対策を講ず
るよう要求されることがあります。

VCCI-A

BSMI notice

警告使用者:

這是甲類的資訊產品，在居住的
環境中使用時，可能會造成射頻
干擾，在這種情況下，使用者會
被要求採取某些適當的對策。

Korean notice

Class A equipment

A급 기기 (업무용 방송통신기기)	이 기기는 업무용(A급)으로 전자파적합등록을 한 기기이오니 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정 외의 지역에서 사용하는 것을 목적으로 합니다.

Class B equipment

B급 기기 (가정용 방송통신기기)	이 기기는 가정용(B급)으로 전자파적합등록을 한 기기로서 주로 가정에서 사용하는 것을 목적으로 하며, 모든 지역에서 사용할 수 있습니다.

Chinese notice

Class A equipment

声明
此为 A 级产品，在生活环境中，该产品可能会造成无线电干扰。在这种情况下，可能需要用户对其干扰采取可行的措施。

Laser compliance

This product may be provided with an optical storage device (that is, CD or DVD drive) and/or fiber optic transceiver. Each of these devices contains a laser that is classified as a Class 1 Laser Product in accordance with US FDA regulations and the IEC 60825-1. The product does not emit hazardous laser radiation.

Each laser product complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007; and with IEC 60825-1:2007.

⚠ **WARNING:** Use of controls or adjustments or performance of procedures other than those specified herein or in the laser product's installation guide may result in hazardous radiation exposure. To reduce the risk of exposure to hazardous radiation:

- Do not try to open the module enclosure. There are no user-serviceable components inside.
- Do not operate controls, make adjustments, or perform procedures to the laser device other than those specified herein.
- Allow only HP Authorized Service technicians to repair the unit.

The Center for Devices and Radiological Health (CDRH) of the U.S. Food and Drug Administration implemented regulations for laser products on August 2, 1976. These regulations apply to laser products manufactured from August 1, 1976. Compliance is mandatory for products marketed in the United States.

Battery replacement notice

⚠ **WARNING:** The computer contains an internal lithium manganese dioxide, a vanadium pentoxide, or an alkaline battery pack. A risk of fire and burns exists if the battery pack is not properly handled. To reduce the risk of personal injury:

- Do not attempt to recharge the battery.
- Do not expose the battery to temperatures higher than 60°C (140°F).
- Do not disassemble, crush, puncture, short external contacts, or dispose of in fire or water.

Batteries, battery packs, and accumulators should not be disposed of together with the general household waste. To forward them to recycling or proper disposal, use the public collection system or return them to HP, an authorized HP Partner, or their agents.

For more information about battery replacement or proper disposal, contact an authorized reseller or an authorized service provider.

Taiwan battery recycling notice

The Taiwan EPA requires dry battery manufacturing or importing firms in accordance with Article 15 of the Waste Disposal Act to indicate the recovery marks on the batteries used in sales, giveaway or promotion. Contact a qualified Taiwanese recycler for proper battery disposal.

Power cord statement for Japan

製品には、同梱された電源コードをお使い下さい。
同梱された電源コードは、他の製品では使用出来ません。

Electrostatic discharge

Preventing electrostatic discharge

To prevent damaging the system, be aware of the precautions you need to follow when setting up the system or handling parts. A discharge of static electricity from a finger or other conductor may damage system boards or other static-sensitive devices. This type of damage may reduce the life expectancy of the device.

To prevent electrostatic damage:

- Avoid hand contact by transporting and storing products in static-safe containers.
- Keep electrostatic-sensitive parts in their containers until they arrive at static-free workstations.
- Place parts on a grounded surface before removing them from their containers.
- Avoid touching pins, leads, or circuitry.
- Always be properly grounded when touching a static-sensitive component or assembly.

Grounding methods to prevent electrostatic discharge

Several methods are used for grounding. Use one or more of the following methods when handling or installing electrostatic-sensitive parts:

- Use a wrist strap connected by a ground cord to a grounded workstation or computer chassis. Wrist straps are flexible straps with a minimum of 1 megohm ±10 percent resistance in the ground cords. To provide proper ground, wear the strap snug against the skin.
- Use heel straps, toe straps, or boot straps at standing workstations. Wear the straps on both feet when standing on conductive floors or dissipating floor mats.
- Use conductive field service tools.
- Use a portable field service kit with a folding static-dissipating work mat.

If you do not have any of the suggested equipment for proper grounding, have an authorized reseller install the part.

For more information on static electricity or assistance with product installation, contact an authorized reseller.

Specifications

Environmental specifications

Specification	Value
Temperature range*	
Operating	10°C to 35°C (50°F to 95°F)
Shipping	-30°C to 50°C (-22°F to 122°F)
Storage	-30°C to 60°C (-22°F to 140°F)
Maximum wet bulb temperature	28°C (82.4°F)
Relative humidity (noncondensing)**	
Operating	10% to 90%
Non-operating	5% to 95%

* All temperature ratings shown are for sea level. An altitude derating of 1°C per 300 m (1.8°F per 1,000 ft) to 3048 m (10,000 ft) is applicable. No direct sunlight allowed.
** Storage maximum humidity of 95% is based on a maximum temperature of 45°C (113°F). Altitude maximum for storage corresponds to a pressure minimum of 70 KPa.

Mechanical specifications

Specification	Value
Height	8.73 cm (3.44 in)
Depth, SFF	69.85 cm (27.54 in)
Depth, LFF	74.93 cm (29.5 in)
Width	44.54 cm (17.54 in)
Weight (maximum)	27.2 kg (60.0 lb)
Weight (no drives installed)	20.4 kg (47.2 lb)

Power supply specifications

Depending on installed options, the server is configured with one of the following power supplies:

- HP 460 W CS HE Power Supply (92%) specifications (on page 111)
- HP 460 W CS Platinum Power Supply (94%) specifications (on page 111)
- HP 750 W CS HE Power Supply (92%) specifications (on page 111)
- HP 750 W CS Platinum Power Supply (94%) specifications (on page 112)
- HP 750 W 48V CS Power Supply specifications (on page 112)
- HP 1200 W CS HE Power Supply (90%) specifications (on page 113)

HP 460 W CS HE Power Supply (92%) specifications

Specification	Value
Input requirements	
Rated input voltage	100 to 120 VAC, 200 to 240 VAC
Rated input frequency	50 Hz to 60 Hz
Rated input current	5.5 A at 100 VAC 2.6 A at 200 VAC
Rated input power	526 W at 100V AC input 505 W at 200V AC input
BTUs per hour	1794 at 100V AC input 1725 at 200V AC input
Power supply output	
Rated steady-state power	460 W at 100V to 120V AC input 460 W at 200V to 240V AC input
Maximum peak power	460 W at 100V to 120V AC input 460 W at 200V to 240V AC input

HP 460 W CS Platinum Power Supply (94%) specifications

Specification	Value
Input requirements	
Rated input voltage	100 to 120 VAC, 200 to 240 VAC
Rated input frequency	50 Hz to 60 Hz
Rated input current	5.2 A at 100 VAC 2.5 A at 200 VAC
Rated input power	517 W at 100V AC input 496 W at 200V AC input
Btus per hour	1764 at 100V AC input 1694 at 200V AC input
Power supply output	
Rated steady-state power	460 W at 100V to 120V AC input 460 W at 200V to 240V AC input
Maximum peak power	460 W at 100V to 120V AC input 460 W at 200V to 240V AC input

HP 750 W CS HE Power Supply (92%) specifications

Specification	Value
Input requirements	
Rated input voltage	100 to 120 VAC, 200 to 240 VAC
Rated input frequency	50 Hz to 60 Hz

Rated input current	8.9 A at 100 VAC 4.3 A at 200 VAC
Rated input power	857 W at 100V AC input 824 W at 200V AC input
BTUs per hour	2925 at 100V AC input 2812 at 200V AC input
Power supply output	
Rated steady-state power	750 W at 100V to 120V AC input 750 W at 200V to 240V AC input
Maximum peak power	750 W at 100V to 120V AC input 750 W at 200V to 240V AC input

HP 750 W CS Platinum Power Supply (94%) specifications

Specification	Value
Input requirements	
Rated input voltage	100 to 120 VAC, 200 to 240 VAC
Rated input frequency	50 Hz to 60 Hz
Rated input current	8.5 A at 100 VAC 4.1 A at 200 VAC
Maximum rated input power	843 W at 100V AC input 811 W at 200V AC input
Btus per hour	2878 at 100V AC input 2769 at 200V AC input
Power supply output	
Rated steady-state power	750 W at 100V to 120V AC input 750 W at 200V to 240V AC input
Maximum peak power	750 W at 100V to 120V AC input 750 W at 200V to 240V AC input

HP 750 W 48V CS Power Supply specifications

Specification	Value
Input requirements	
Rated input voltage	100 to 240 VAC
Rated Input frequency	50 HZ to 60 HZ
Rated input current	9 to 4.5 A
Maximum rated input power	815 W at 36 VDC input 805 W at 48 VDC input 795 W at 72 VDC input
Btus per hour	2780 at 36 VDC input 2740 at 48 VDC input 2720 at 72 VDC input
Power supply output	
Rated steady-state power	750 W

Maximum peak power	750 W

HP 1200 W CS HE Power Supply (90%) specifications

Specification	Value
Input requirements	
Rated input voltage	100 to 120 VAC, 200 to 240 VAC
Rated input frequency	50 Hz to 60 Hz
Rated input current	9.1 A at 100 VAC 6.7 A at 200 VAC
Maximum rated input power	897 W at 100V AC input 1321 W at 200V AC input
Btus per hour	3408 at 120V AC input 4433 at 200V to 240V AC input
Power supply output	
Rated steady-state power	800 W at 100V AC input 900 W at 120V AC input 1200 W at 200V to 240V AC input
Maximum peak power	800 W at 100V AC input 900 W at 120V AC input 1200 W at 200V to 240V AC input

Technical support

Before you contact HP

Be sure to have the following information available before you call HP:

- Technical support registration number (if applicable)
- Product serial number
- Product model name and number
- Product identification number
- Applicable error messages
- Add-on boards or hardware
- Third-party hardware or software
- Operating system type and revision level

HP contact information

For United States and worldwide contact information, see the Contact HP website (http://www.hp.com/go/assistance).

In the United States:

- To contact HP by phone, call 1-800-334-5144. For continuous quality improvement, calls may be recorded or monitored.
- If you have purchased a Care Pack (service upgrade), see the Support & Drivers website (http://www8.hp.com/us/en/support-drivers.html). If the problem cannot be resolved at the website, call 1-800-633-3600. For more information about Care Packs, see the HP website (http://pro-aq-sama.houston.hp.com/services/cache/10950-0-0-225-121.html).

Customer Self Repair

HP products are designed with many Customer Self Repair (CSR) parts to minimize repair time and allow for greater flexibility in performing defective parts replacement. If during the diagnosis period HP (or HP service providers or service partners) identifies that the repair can be accomplished by the use of a CSR part, HP will ship that part directly to you for replacement. There are two categories of CSR parts:

- **Mandatory**—Parts for which customer self repair is mandatory. If you request HP to replace these parts, you will be charged for the travel and labor costs of this service.
- **Optional**—Parts for which customer self repair is optional. These parts are also designed for customer self repair. If, however, you require that HP replace them for you, there may or may not be additional charges, depending on the type of warranty service designated for your product.

NOTE: Some HP parts are not designed for customer self repair. In order to satisfy the customer warranty, HP requires that an authorized service provider replace the part. These parts are identified as "No" in the Illustrated Parts Catalog.

Based on availability and where geography permits, CSR parts will be shipped for next business day delivery. Same day or four-hour delivery may be offered at an additional charge where geography permits. If assistance is required, you can call the HP Technical Support Center and a technician will help you over the telephone. HP specifies in the materials shipped with a replacement CSR part whether a defective part must be returned to HP. In cases where it is required to return the defective part to HP, you must ship the defective part back to HP within a defined period of time, normally five (5) business days. The defective part must be returned with the associated documentation in the provided shipping material. Failure to return the defective part may result in HP billing you for the replacement. With a customer self repair, HP will pay all shipping and part return costs and determine the courier/carrier to be used.

For more information about HP's Customer Self Repair program, contact your local service provider. For the North American program, refer to the HP website (http://www.hp.com/go/selfrepair).

Réparation par le client (CSR)

Les produits HP comportent de nombreuses pièces CSR (Customer Self Repair = réparation par le client) afin de minimiser les délais de réparation et faciliter le remplacement des pièces défectueuses. Si pendant la période de diagnostic, HP (ou ses partenaires ou mainteneurs agréés) détermine que la réparation peut être effectuée à l'aide d'une pièce CSR, HP vous l'envoie directement. Il existe deux catégories de pièces CSR:

Obligatoire - Pièces pour lesquelles la réparation par le client est obligatoire. Si vous demandez à HP de remplacer ces pièces, les coûts de déplacement et main d'œuvre du service vous seront facturés.

Facultatif - Pièces pour lesquelles la réparation par le client est facultative. Ces pièces sont également conçues pour permettre au client d'effectuer lui-même la réparation. Toutefois, si vous demandez à HP de remplacer ces pièces, l'intervention peut ou non vous être facturée, selon le type de garantie applicable à votre produit.

REMARQUE: Certaines pièces HP ne sont pas conçues pour permettre au client d'effectuer lui-même la réparation. Pour que la garantie puisse s'appliquer, HP exige que le remplacement de la pièce soit effectué par un Mainteneur Agréé. Ces pièces sont identifiées par la mention "Non" dans le Catalogue illustré.

Les pièces CSR sont livrées le jour ouvré suivant, dans la limite des stocks disponibles et selon votre situation géographique. Si votre situation géographique le permet et que vous demandez une livraison le jour même ou dans les 4 heures, celle-ci vous sera facturée. Pour bénéficier d'une assistance téléphonique, appelez le Centre d'assistance technique HP. Dans les documents envoyés avec la pièce de rechange CSR, HP précise s'il est nécessaire de lui retourner la pièce défectueuse. Si c'est le cas, vous devez le faire dans le délai indiqué, généralement cinq (5) jours ouvrés. La pièce et sa documentation doivent être retournées dans l'emballage fourni. Si vous ne retournez pas la pièce défectueuse, HP se réserve le droit de vous facturer les coûts de remplacement. Dans le cas d'une pièce CSR, HP supporte l'ensemble des frais d'expédition et de retour, et détermine la société de courses ou le transporteur à utiliser.

Pour plus d'informations sur le programme CSR de HP, contactez votre Mainteneur Agrée local. Pour plus d'informations sur ce programme en Amérique du Nord, consultez le site Web HP (http://www.hp.com/go/selfrepair).

Riparazione da parte del cliente

Per abbreviare i tempi di riparazione e garantire una maggiore flessibilità nella sostituzione di parti difettose, i prodotti HP sono realizzati con numerosi componenti che possono essere riparati direttamente dal cliente (CSR, Customer Self Repair). Se in fase di diagnostica HP (o un centro di servizi o di assistenza HP) identifica il guasto come riparabile mediante un ricambio CSR, HP lo spedirà direttamente al cliente per la sostituzione. Vi sono due categorie di parti CSR:

Obbligatorie – Parti che devono essere necessariamente riparate dal cliente. Se il cliente ne affida la riparazione ad HP, deve sostenere le spese di spedizione e di manodopera per il servizio.

Opzionali – Parti la cui riparazione da parte del cliente è facoltativa. Si tratta comunque di componenti progettati per questo scopo. Se tuttavia il cliente ne richiede la sostituzione ad HP, potrebbe dover sostenere spese addizionali a seconda del tipo di garanzia previsto per il prodotto.

NOTA: alcuni componenti HP non sono progettati per la riparazione da parte del cliente. Per rispettare la garanzia, HP richiede che queste parti siano sostituite da un centro di assistenza autorizzato. Tali parti sono identificate da un "No" nel Catalogo illustrato dei componenti.

In base alla disponibilità e alla località geografica, le parti CSR vengono spedite con consegna entro il giorno lavorativo seguente. La consegna nel giorno stesso o entro quattro ore è offerta con un supplemento di costo solo in alcune zone. In caso di necessità si può richiedere l'assistenza telefonica di un addetto del centro di supporto tecnico HP. Nel materiale fornito con una parte di ricambio CSR, HP specifica se il cliente deve restituire dei componenti. Qualora sia richiesta la resa ad HP del componente difettoso, lo si deve spedire ad HP entro un determinato periodo di tempo, generalmente cinque (5) giorni lavorativi. Il componente difettoso deve essere restituito con la documentazione associata nell'imballo di spedizione fornito. La mancata restituzione del componente può comportare la fatturazione del ricambio da parte di HP. Nel caso di riparazione da parte del cliente, HP sostiene tutte le spese di spedizione e resa e sceglie il corriere/vettore da utilizzare.

Per ulteriori informazioni sul programma CSR di HP contattare il centro di assistenza di zona. Per il programma in Nord America fare riferimento al sito Web HP (http://www.hp.com/go/selfrepair).

Customer Self Repair

HP Produkte enthalten viele CSR-Teile (Customer Self Repair), um Reparaturzeiten zu minimieren und höhere Flexibilität beim Austausch defekter Bauteile zu ermöglichen. Wenn HP (oder ein HP Servicepartner) bei der Diagnose feststellt, dass das Produkt mithilfe eines CSR-Teils repariert werden kann, sendet Ihnen HP dieses Bauteil zum Austausch direkt zu. CSR-Teile werden in zwei Kategorien unterteilt:

Zwingend – Teile, für die das Customer Self Repair-Verfahren zwingend vorgegeben ist. Wenn Sie den Austausch dieser Teile von HP vornehmen lassen, werden Ihnen die Anfahrt- und Arbeitskosten für diesen Service berechnet.

Optional – Teile, für die das Customer Self Repair-Verfahren optional ist. Diese Teile sind auch für Customer Self Repair ausgelegt. Wenn Sie jedoch den Austausch dieser Teile von HP vornehmen lassen möchten, können bei diesem Service je nach den für Ihr Produkt vorgesehenen Garantiebedingungen zusätzliche Kosten anfallen.

HINWEIS: Einige Teile sind nicht für Customer Self Repair ausgelegt. Um den Garantieanspruch des Kunden zu erfüllen, muss das Teil von einem HP Servicepartner ersetzt werden. Im illustrierten Teilekatalog sind diese Teile mit „No“ bzw. „Nein“ gekennzeichnet.

CSR-Teile werden abhängig von der Verfügbarkeit und vom Lieferziel am folgenden Geschäftstag geliefert. Für bestimmte Standorte ist eine Lieferung am selben Tag oder innerhalb von vier Stunden gegen einen Aufpreis verfügbar. Wenn Sie Hilfe benötigen, können Sie das HP technische Support Center anrufen und sich von einem Mitarbeiter per Telefon helfen lassen. Den Materialien, die mit einem CSR-Ersatzteil geliefert werden, können Sie entnehmen, ob das defekte Teil an HP zurückgeschickt werden muss. Wenn es erforderlich ist, das defekte Teil an HP zurückzuschicken, müssen Sie dies innerhalb eines vorgegebenen Zeitraums tun, in der Regel innerhalb von fünf (5) Geschäftstagen. Das defekte Teil muss mit der zugehörigen Dokumentation in der Verpackung zurückgeschickt werden, die im Lieferumfang enthalten ist. Wenn Sie das defekte Teil nicht zurückschicken, kann HP Ihnen das Ersatzteil in Rechnung stellen. Im Falle von Customer Self Repair kommt HP für alle Kosten für die Lieferung und Rücksendung auf und bestimmt den Kurier-/Frachtdienst.

Weitere Informationen über das HP Customer Self Repair Programm erhalten Sie von Ihrem Servicepartner vor Ort. Informationen über das CSR-Programm in Nordamerika finden Sie auf der HP Website unter (http://www.hp.com/go/selfrepair).

Reparaciones del propio cliente

Los productos de HP incluyen muchos componentes que el propio usuario puede reemplazar (*Customer Self Repair*, CSR) para minimizar el tiempo de reparación y ofrecer una mayor flexibilidad a la hora de realizar sustituciones de componentes defectuosos. Si, durante la fase de diagnóstico, HP (o los proveedores o socios de servicio de HP) identifica que una reparación puede llevarse a cabo mediante el uso de un componente CSR, HP le enviará dicho componente directamente para que realice su sustitución. Los componentes CSR se clasifican en dos categorías:

- **Obligatorio:** componentes para los que la reparación por parte del usuario es obligatoria. Si solicita a HP que realice la sustitución de estos componentes, tendrá que hacerse cargo de los gastos de desplazamiento y de mano de obra de dicho servicio.
- **Opcional:** componentes para los que la reparación por parte del usuario es opcional. Estos componentes también están diseñados para que puedan ser reparados por el usuario. Sin embargo, si precisa que HP realice su sustitución, puede o no conllevar costes adicionales, dependiendo del tipo de servicio de garantía correspondiente al producto.

NOTA: Algunos componentes no están diseñados para que puedan ser reparados por el usuario. Para que el usuario haga valer su garantía, HP pone como condición que un proveedor de servicios autorizado realice la sustitución de estos componentes. Dichos componentes se identifican con la palabra "No" en el catálogo ilustrado de componentes.

Según la disponibilidad y la situación geográfica, los componentes CSR se enviarán para que lleguen a su destino al siguiente día laborable. Si la situación geográfica lo permite, se puede solicitar la entrega en el mismo día o en cuatro horas con un coste adicional. Si precisa asistencia técnica, puede llamar al Centro de asistencia técnica de HP y recibirá ayuda telefónica por parte de un técnico. Con el envío de materiales para la sustitución de componentes CSR, HP especificará si los componentes defectuosos deberán devolverse a HP. En aquellos casos en los que sea necesario devolver algún componente a HP, deberá hacerlo en el periodo de tiempo especificado, normalmente cinco días laborables. Los componentes defectuosos deberán devolverse con toda la documentación relacionada y con el embalaje de envío. Si no enviara el componente defectuoso requerido, HP podrá cobrarle por el de sustitución. En el caso de todas sustituciones que lleve a cabo el cliente, HP se hará cargo de todos los gastos de envío y devolución de componentes y escogerá la empresa de transporte que se utilice para dicho servicio.

Para obtener más información acerca del programa de Reparaciones del propio cliente de HP, póngase en contacto con su proveedor de servicios local. Si está interesado en el programa para Norteamérica, visite la página web de HP siguiente (http://www.hp.com/go/selfrepair).

Customer Self Repair

Veel onderdelen in HP producten zijn door de klant zelf te repareren, waardoor de reparatieduur tot een minimum beperkt kan blijven en de flexibiliteit in het vervangen van defecte onderdelen groter is. Deze onderdelen worden CSR-onderdelen (Customer Self Repair) genoemd. Als HP (of een HP Service Partner) bij de diagnose vaststelt dat de reparatie kan worden uitgevoerd met een CSR-onderdeel, verzendt HP dat onderdeel rechtstreeks naar u, zodat u het defecte onderdeel daarmee kunt vervangen. Er zijn twee categorieën CSR-onderdelen:

Verplicht: Onderdelen waarvoor reparatie door de klant verplicht is. Als u HP verzoekt deze onderdelen voor u te vervangen, worden u voor deze service reiskosten en arbeidsloon in rekening gebracht.

Optioneel: Onderdelen waarvoor reparatie door de klant optioneel is. Ook deze onderdelen zijn ontworpen voor reparatie door de klant. Als u echter HP verzoekt deze onderdelen voor u te vervangen, kunnen daarvoor extra kosten in rekening worden gebracht, afhankelijk van het type garantieservice voor het product.

OPMERKING: Sommige HP onderdelen zijn niet ontwikkeld voor reparatie door de klant. In verband met de garantievoorwaarden moet het onderdeel door een geautoriseerde Service Partner worden vervangen. Deze onderdelen worden in de geïllustreerde onderdelencatalogus aangemerkt met "Nee".

Afhankelijk van de leverbaarheid en de locatie worden CSR-onderdelen verzonden voor levering op de eerstvolgende werkdag. Levering op dezelfde dag of binnen vier uur kan tegen meerkosten worden aangeboden, indien dit mogelijk is gezien de locatie. Indien assistentie gewenst is, belt u een HP Service Partner om via de telefoon technische ondersteuning te ontvangen. HP vermeldt in de documentatie bij het vervangende CSR-onderdeel of het defecte onderdeel aan HP moet worden geretourneerd. Als het defecte onderdeel aan HP moet worden teruggezonden, moet u het defecte onderdeel binnen een bepaalde periode, gewoonlijk vijf (5) werkdagen, retourneren aan HP. Het defecte onderdeel moet met de bijbehorende documentatie worden geretourneerd in het meegeleverde verpakkingsmateriaal. Als u het defecte onderdeel niet terugzendt, kan HP u voor het vervangende onderdeel kosten in rekening brengen. Bij reparatie door de klant betaalt HP alle verzendkosten voor het vervangende en geretourneerde onderdeel en kiest HP zelf welke koerier/transportonderneming hiervoor wordt gebruikt.

Neem contact op met een Service Partner voor meer informatie over het Customer Self Repair programma van HP. Informatie over Service Partners vindt u op de HP website (http://www.hp.com/go/selfrepair).

Reparo feito pelo cliente

Os produtos da HP são projetados com muitas peças para reparo feito pelo cliente (CSR) de modo a minimizar o tempo de reparo e permitir maior flexibilidade na substituição de peças com defeito. Se, durante o período de diagnóstico, a HP (ou fornecedores/parceiros de serviço da HP) concluir que o reparo pode ser efetuado pelo uso de uma peça CSR, a peça de reposição será enviada diretamente ao cliente. Existem duas categorias de peças CSR:

Obrigatória – Peças cujo reparo feito pelo cliente é obrigatório. Se desejar que a HP substitua essas peças, serão cobradas as despesas de transporte e mão-de-obra do serviço.

Opcional – Peças cujo reparo feito pelo cliente é opcional. Essas peças também são projetadas para o reparo feito pelo cliente. No entanto, se desejar que a HP as substitua, pode haver ou não a cobrança de taxa adicional, dependendo do tipo de serviço de garantia destinado ao produto.

OBSERVAÇÃO: Algumas peças da HP não são projetadas para o reparo feito pelo cliente. A fim de cumprir a garantia do cliente, a HP exige que um técnico autorizado substitua a peça. Essas peças estão identificadas com a marca "No" (Não), no catálogo de peças ilustrado.

Conforme a disponibilidade e o local geográfico, as peças CSR serão enviadas no primeiro dia útil após o pedido. Onde as condições geográficas permitirem, a entrega no mesmo dia ou em quatro horas pode ser feita mediante uma taxa adicional. Se precisar de auxílio, entre em contato com o Centro de suporte técnico da HP para que um técnico o ajude por telefone. A HP especifica nos materiais fornecidos com a peça CSR de reposição se a peça com defeito deve ser devolvida à HP. Nos casos em que isso for necessário, é preciso enviar a peça com defeito à HP dentro do período determinado, normalmente cinco (5) dias úteis. A peça com defeito deve ser enviada com a documentação correspondente no material de transporte fornecido. Caso não o faça, a HP poderá cobrar a reposição. Para as peças de reparo feito pelo cliente, a HP paga todas as despesas de transporte e de devolução da peça e determina a transportadora/serviço postal a ser utilizado.

Para obter mais informações sobre o programa de reparo feito pelo cliente da HP, entre em contato com o fornecedor de serviços local. Para o programa norte-americano, visite o site da HP (http://www.hp.com/go/selfrepair).

顧客自己修理保証サービス

修理時間を短縮し、故障部品の交換における高い柔軟性を確保するために、HP製品には多数の顧客自己修理（CSR）部品があります。診断の際に、CSR部品を使用すれば修理ができるとHP（HPまたはHP正規保守代理店）が判断した場合、HPはその部品を直接、お客様に発送し、お客様に交換していただきます。CSR部品には以下の2通りがあります。

- 必須 - 顧客自己修理が必須の部品。当該部品について、もしもお客様がHPに交換作業を依頼される場合には、その修理サービスに関する交通費および人件費がお客様に請求されます。
- 任意 - 顧客自己修理が任意である部品。この部品も顧客自己修理用です。当該部品について、もしもお客様がHPに交換作業を依頼される場合には、お買い上げの製品に適用される保証サービス内容の範囲内においては、別途費用を負担していただくことなく保証サービスを受けることができます。

注： HP製品の一部の部品は、顧客自己修理用ではありません。製品の保証を継続するためには、HPまたはHP正規保守代理店による交換作業が必須となります。部品カタログには、当該部品が顧客自己修理除外品である旨が記載されています。

部品供給が可能な場合、地域によっては、CSR部品を翌営業日に届くように発送します。また、地域によっては、追加費用を負担いただくことにより同日または4時間以内に届くように発送することも可能な場合があります。サポートが必要なときは、HPの修理受付窓口に電話していただければ、技術者が電話でアドバイスします。交換用のCSR部品または同梱物には、故障部品をHPに返送する必要があるかどうかが表示されています。故障部品をHPに返送する必要がある場合は、指定期限内（通常は5営業日以内）に故障部品をHPに返送してください。故障部品を返送する場合は、届いた時の梱包箱に関連書類とともに入れてください。故障部品を返送しない場合、HPから部品費用が請求されます。顧客自己修理の際には、HPは送料および部品返送費を全額負担し、使用する宅配便会社や運送会社を指定します。

客户自行维修

HP 产品提供许多客户自行维修 (CSR) 部件，以尽可能缩短维修时间和在更换缺陷部件方面提供更大的灵活性。如果在诊断期间 HP（或 HP 服务提供商或服务合作伙伴）确定可以通过使用 CSR 部件完成维修，HP 将直接把该部件发送给您进行更换。有两类 CSR 部件：

- **强制性的** — 要求客户必须自行维修的部件。如果您请求 HP 更换这些部件，则必须为该服务支付差旅费和人工费用。
- **可选的** — 客户可以选择是否自行维修的部件。这些部件也是为客户自行维修设计的。不过，如果您要求 HP 为您更换这些部件，则根据为您的产品指定的保修服务类型，HP 可能收取或不再收取任何附加费用。

注：某些 HP 部件的设计并未考虑客户自行维修。为了满足客户保修的需要，HP 要求授权服务提供商更换相关部件。这些部件在部件图解目录中标记为“否”。

CSR 部件将在下一个工作日发运（取决于备货情况和允许的地理范围）。在允许的地理范围内，可在当天或四小时内发运，但要收取额外费用。如果需要帮助，您可以致电 HP 技术支持中心，将会有技术人员通过电话为您提供帮助。HP 会在随更换的 CSR 部件发运的材料中指明是否必须将有缺陷的部件返还给 HP。如果要求您将有缺陷的部件返还给 HP，那么您必须在规定期限内（通常是五 (5) 个工作日）将缺陷部件发给 HP。有缺陷的部件必须随所提供的发运材料中的相关文件一起返还。如果未能送还有缺陷的部件，HP 可能会要求您支付更换费用。客户自行维修时，HP 将承担所有相关运输和部件返回费用，并指定快递商/承运商。

有关 HP 客户自行维修计划的详细信息，请与您当地的服务提供商联系。有关北美地区的计划，请访问 HP 网站 (http://www.hp.com/go/selfrepair)。

客戶自行維修

HP 產品設計了許多「客戶自行維修」(CSR) 的零件以減少維修時間，並且使得更換瑕疵零件時能有更大的彈性。如果在診斷期間 HP（或 HP 服務供應商或維修夥伴）辨認出此項維修工作可以藉由使用 CSR 零件來完成，則 HP 將直接寄送該零件給您作更換。CSR 零件分為兩種類別：

- **強制的** — 客戶自行維修所使用的零件是強制性的。如果您要求 HP 更換這些零件，HP 將會向您收取此服務所需的外出費用與勞動成本。
- **選購的** — 客戶自行維修所使用的零件是選購的。這些零件也設計用於客戶自行維修之用。不過，如果您要求 HP 為您更換，則可能需要也可能不需要負擔額外的費用，端視針對此產品指定的保固服務類型而定。

備註：某些 HP 零件沒有消費者可自行維修的設計。為符合客戶保固，HP 需要授權的服務供應商更換零件。這些零件在圖示的零件目錄中，被標示為「否」。

基於材料取得及環境允許的情況下，CSR 零件將於下一個工作日以快遞寄送。在環境的允許下當天或四小時內送達，則可能需要額外的費用。若您需要協助，可致電「HP 技術支援中心」，會有一位技術人員透過電話來協助您。不論損壞的零件是否必須退回，HP 皆會在與 CSR 替換零件一起運送的材料中註明。若要將損壞的零件退回 HP，您必須在指定的一段時間內（通常為五 (5) 個工作天），將損壞的零件寄回 HP。損壞的零件必須與寄送資料中隨附的相關技術文件一併退還。如果無法退還損壞的零件，HP 可能要向您收取替換費用。針對客戶自行維修情形，HP 將負責所有運費及零件退還費用並指定使用何家快遞/貨運公司。

如需 HP 的「客戶自行維修」方案詳細資訊，請連絡您當地的服務供應商。至於北美方案，請參閱 HP 網站 (http://www.hp.com/go/selfrepair)。

고객 셀프 수리

HP 제품은 수리 시간을 최소화하고 결함이 있는 부품 교체 시 더욱 융통성을 발휘할 수 있도록 하기 위해 고객 셀프 수리(CSR) 부품을 다량 사용하여 설계되었습니다. 진단 기간 동안 HP(또는 HP 서비스 공급업체 또는 서비스 협력업체)에서 CSR 부품을 사용하여 수리가 가능하다고 판단되면 HP는 해당 부품을 바로 사용자에게 보내어 사용자가 교체할 수 있도록 합니다. CSR 부품에는 두 가지 종류가 있습니다.

- **고객 셀프 수리가 의무 사항인 필수 부품.** 사용자가 HP에 이 부품의 교체를 요청할 경우 이 서비스에 대한 출장비 및 작업비가 청구됩니다.
- **고객 셀프 수리가 선택 사항인 부품.** 이 부품들도 고객 셀프 수리가 가능하도록 설계되었습니다. 하지만 사용자가 HP에 이 부품의 교체를 요청할 경우 사용자가 구입한 제품에 해당하는 보증 서비스 유형에 따라 추가 비용 없이 교체가 가능할 수 있습니다.

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CSR 부품은 재고 상태와 지리적 조건이 허용하는 경우 다음 영업일 납품이 가능하도록 배송이 이루어집니다. 지리적 조건이 허용하는 경우 추가 비용이 청구되는 조건으로 당일 또는 4시간 배송이 가능할 수도 있습니다. 도움이 필요하시면 HP 기술 지원 센터로 전화하십시오. 전문 기술자가 전화로 도움을 줄 것입니다. HP는 결함이 발생한 부품을 HP로 반환해야 하는지 여부를 CSR 교체 부품과 함께 배송된 자료에 지정합니다. 결함이 발생한 부품을 HP로 반환해야 하는 경우에는 지정된 기간 내(통상 영업일 기준 5일)에 HP로 반환해야 합니다. 이 때 결함이 발생한 부품은 제공된 포장 재료에 넣어 관련 설명서와 함께 반환해야 합니다. 결함이 발생한 부품을 반환하지 않는 경우 HP가 교체 부품에 대해 비용을 청구할 수 있습니다. 고객 셀프 수리의 경우, HP는 모든 운송 및 부품 반환 비용을 부담하며 이용할 운송업체 및 택배 서비스를 결정합니다.

HP 고객 셀프 수리 프로그램에 대한 자세한 내용은 가까운 서비스 제공업체에 문의하십시오. 북미 지역의 프로그램에 대해서는 HP 웹 사이트(http://www.hp.com/go/selfrepair)를 참조하십시오.

Acronyms and abbreviations

ABEND

abnormal end

ACU

Array Configuration Utility

AMP

Advanced Memory Protection

ASR

Automatic Server Recovery

CSA

Canadian Standards Association

CSR

Customer Self Repair

DDR

double data rate

FBWC

flash-backed write cache

IEC

International Electrotechnical Commission

iLO

Integrated Lights-Out

IML

Integrated Management Log

ISEE

Instant Support Enterprise Edition

LFF

large form-factor

NMI

non-maskable interrupt

NVRAM

non-volatile memory

ORCA

Option ROM Configuration for Arrays

PCIe

peripheral component interconnect express

POST

Power-On Self Test

PSP

ProLiant Support Pack

RBSU

ROM-Based Setup Utility

RDIMM

Registered Dual In-line Memory Module

RDP

Rapid Deployment Pack

SAS

serial attached SCSI

SATA

serial ATA

SELV

separated extra low voltage

SFF

small form-factor

SIM

Systems Insight Manager

TMRA

recommended ambient operating temperature

TPM

trusted platform module

UDIMM

Unregistered Dual In-Line Memory Module

UID

unit identification

UPS

uninterruptible power system

USB

universal serial bus

VCA

Version Control Agent

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